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BAKING TECHNOLOGY

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# This New Year Of Opportunity

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"IT takes just about seven years for a government employee to die." This destructive effect of routine service is described by Franklin K. Lane who in his short but splendid career in Washington vitalized his clerks and assistants by the western vigor which he brought to his work of administering the affairs of the Department of the Interior. How long does it take a baker to die? Does the routine service which will always be the foundation of the baking industry destroy ambition and develop narrow visioned, constricted minds?

This New Year of opportunity will afford ample time in which to search out the answer. It is certain that if the "old man" who dominated your business in 1925 is taken over into the twelve months ahead there will be neither room nor opportunity for the new man to bring to the industry a finer spirit of service nor to achieve the greater things which are marked up for accomplishment on the calendar of time.

If the old man of the completed year steps aside that the youth with vision and ambition may come to the front the baking industry is entering into its greatest era of development. And youth is not a measure of years of service. Rather it is but an indication of an open mind, the baking industry lends itself better for development in an almost unlimited field than does the campaign for increased pie consumption. Pie has been laboring under many unmerited and unjust criticisms. If pies have lacked the appetite appeal of home-made pies their quality can be improved and indeed great progress has been made to that end during the past few years. If the consumption of pies has been lessened because of the belief that there is something indigestible about pie the telling of the real facts as to the suitability of pie for every meal for every member of the family will make a larger market. The program for the pie conference is rich in technical and practical information for every pie baker. As it has been tentatively arranged it will discuss the following important subjects:

Ingredients and purity standards.
Production problems.
Standards for judging pie quality.
Institute service for pie bakers.

On Tuesday, February 23rd, Simon Hubig will open the discussion of distribution methods, packaging, wrapping, and delivery. Pie salesmanship and pie advertising are the next two subjects for discussion, in which successful pie bakers and advertising experts will take part.

Jean K. Rich of the Institute will lead the discussion of the final subject before the conference, ''Nutritional Education for the Consumer,'' and will show how the pie baker can increase his sales by using the up-to-date knowledge of the nutritive value and digestibility of pie in combatting the mistaken notions which have limited pie eating to a pleasant but not altogether desirable finale to a complete meal.

As in the case of the cake conferences attendance at the discussions of problems of pie baking will be open to every baker without any requirement of membership in either the Association or the Institute. If American Institute of Baking, in its role of scientific and educational leadership of the baking industry, can develop the conference method of studying the problems of better nutrition through the increased consumption of pie, cake, bread, and all the other products of flour to the benefit of every baker, the wisdom of the men who have contributed so much to the carrying on of its work will have been fully confirmed.

That is the purpose of the Institute. That is the only reason why it should expect the appreciative support of every baker everywhere.

### *The House to House Conference*

For several years bakers who sell their products direct to the housewife by taking the bread and cake from their plants to the kitchen door have been meeting for discussion of their mutual problems.

While the production methods of house to house bakers are but little different from those of other wholesale bakers the method of distribution introduces new factors into the business which are essentially different from the technique of the sales-manager who directs the sale of goods through the grocery store. The progress this branch of the baking industry will make in the years ahead will be determined by the proper working out of every detail of transportation and delivery.

The first mid-winter conference of house to house bakers will also be held at American Institute of Baking. The date will be announced by invitation. The program for discussion promises to be rich in the vital topics which concern this group.

### *Trade Promotion Conference*

When American Institute of Baking arranged its first exposition of the advertising methods by which bakers brought their products to the attention of consumers at the Atlantic City Convention in 1924 it stimulated the interest of all progressive sales and advertising managers and paved the way for the first conference of the trade promotion group which met at the Institute last February. The second conference will be held at American Institute of Baking, February 24th and 25th and will provide the opportunity so greatly desired for a thorough discussion of the psychology of salesmanship and advertising. The production of bakery goods has been carried to a high state of perfection but little is yet known about getting them into consumption. If the fifty per cent of home-baked goods is to be transferred to bakery accounts it will be very largely due to the work of trade promotion. Dr. L. A. Rumsey, in charge of the Trade Promotion Department of the Association has worked out a program which has never been equalled by any conference of the food industries.

The first subject for discussion on Wednesday morning, February 24th, will be ''Improving the Sale of Baked Products Through the Grocery Store.'' An experienced sales manager will discuss the baker's point of view and H. C. Balsiger, Secretary of the National Association of Retail Grocers, will then tell ''How the Grocer Looks at the Bread Business.'' After these baker-grocer angles have been brought before the conference, the discussion which will follow should be very profitable.

On Wednesday afternoon, Dr. Paul W. Ivey, following the same general theme, will bring his wide experience in teaching salesmanship to a discussion of ''The Training of the Grocer for Better Sales Practice.''

Thursday morning H. N. Tolles, who has so often spoken before bakers' groups and who through the Sheldon School is arranging a course in salesmanship training, will discuss ''Training the Employe for Better Business.''

Jean K. Rich of the Department of Nutritional Education of the Institute, will then show how the baking industry can ''Make the Industry Work For You.'' Her discussion will lead up to a special program which may be continued on February 26th, in which women who are developing new departments of Home Economics for the baking or milling industries, will consider every angle of their work in the interest of a better appreciation and larger consumption of baked products.

In arranging these meetings, the conferences of cake bakers and pie bakers are scheduled for the same days, and since the programs will be given at the Institute it will be possible for the men who are interested in both cake and pies to take part in both programs.

The Trade Promotion Conference will be held on the two days following, and while most of those in attendance will come in for that meeting, it is hoped that many who have attended the Cake and Pie Conferences will remain to participate in the splendid program which has been arranged.

On Friday, February 26th, a group meeting of women who are associated with the milling and baking industries is being arranged by Miss Rich in the thought that the time has now come for recognizing the importance of trained home economics leaders and nutritional workers in these industries. Modern bakeries are equipped to produce and sell bakery products and the nutritional education of consumers is as important a branch of the work as the production of baked goods. In developing her conference program, Miss Rich will be assisted by leaders in home economics and nutritional field as well as by women from the baking and milling industries who have made an outstanding success of their departments.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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JANUARY, 15, 1926

### *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

## *Still Breaking Records*

THE increased membership in American Bakers Association for the year 1925 has been very gratifying and breaks previous years' records. However, that doesn't mean much when compared with the number of Bakers not yet enrolled, who should be members of the A. B. A.

Nevertheless, breaking a record signifies Success, regardless of how close the margin, and with this thought in mind we should start the New Year pushing Success—a good rule for all of us.

This may sound like old stuff, but wait—

Aren't we being constantly advised to study our failures, so that we will not make the same mistake twice? Then, why not reverse the rule and study our successes, in order that we may repeat them?

Half the trouble with most of us lies in our refusal to follow up Success, but we are going to try to eliminate that laxness this New Year through a concentration of effort in "following through" by the Membership Committee, a group of men whose duty it will be to keep everlastingly behind our members to constantly solicit new members by selling them the wonderful service of the A. B. A. and the American Institute of Baking.

> "A good thought, well expressed, is often a source of inspiration to thousands whom the author never sees."

Well, who can have better thoughts of the A. B. A. and the Institute than our present members, who should feel it an honor and a duty to express them to his fellow-Bakers not now enjoying the great privileges of the former?

What better opportunity than now, to wish every Baker not a member of the A. B. A. a Happy and Prosperous New Year by having him sign on the dotted line?

Records are made only to be broken, so—

Let's smash to smithereens the records of 1925 and establish a new high mark in 1926 that will make all others of Industrial Organizations sit up and take notice of our accomplishments!

Yours for a record-breaker,
AMERICAN BAKERS ASSOCIATION,
L. A. SCHILLINGER,
*Chairman, Membership Committee.*

## *Collective Judgment*

IF two heads are better than one, as an old adage has it, what wonderful progress should be made when two hundred "heads" of baking businesses come together to discuss the ways and means of increasing the amounts of their baked goods which the public can accept. There are few men in the business of baking and selling of bread, pie, cake, or sweet goods who are big enough to travel very far alone against the collective judgment reached by their fellow bakers during two or three days of exchanging experiences.

Just before New Year's, the press of America was filled with the records of business security and prosperity the past year, and with predictions for continued gains during 1926. As one economist expressed it, we have consolidated the gains in business stability made since the war. Normalcy, the condition everybody talked about, is real again.

Some believe the baking industry had already reached that state a year ago, and that it now enters the New Business Era, settling down to what the Trade Relations Committee, United States Chamber of Commerce, calls "intensive cultivation." They say: "This new business era will ask as the price of success, qualities quite different from those which enabled many business men to flourish in the last century. The days of ruthless self-interest and careless indifference to other considerations are gone. Ethical relationships between business men are historical necessities."

These ethical relationships mean mutual understanding of each other, and are attained most quickly through the personal meeting of men, face to face and voice to voice.

Herbert Hoover said to the National Distribution Conference at Washington:

**"Stability or instability in productions and distribution is largely the result of the collective judgment of the trades. They cannot form a right judgment unless they know the facts as to their own business and as to the trade as a whole."**

Collective Judgment is to be the result of those conferences at American Institute of Baking in February; out of such conferences will grow a picture of the New Business Era for our industry. In them is seen the hope for business stability.

L. A. Rumsey.

# *A Debunking Process*

WHEN lubricating oils at twenty cents a gallon are reported by the Society of Automotive Engineers to be quite as good as oil at $1.35 and when a solution for moistening stencils can be made by government chemists for from five to twenty-three cents a gallon which does the same excellent work as a private brand costing $3.20 a gallon does it not seem to be time for the buyers for the baking industry to give more study to the value of specifications and analytical control?

Billions for Consumers is the thought-compelling title of an article on page 16 of this issue of Baking Technology. It is worth careful study. It contains quite as valuable dividend producing material as any new plan for increasing sales or any improved machine for cutting down production costs.

One of the first projects undertaken by American Institute of Baking was the development of the plan by which materials used in baking may be registered by the Institute after a critical study has shown the article in question to be up to the standards under which it is sold and the advertising claims made for it.

A great variety of products have been examined and registered and the value of the method for certifying to bakery buyers the honesty of their supplies is now fully appreciated. Different products have been registered and applications are constantly being received. Because of misrepresentations of claims for efficiency or quality, of ununiformity of product, or illegality under the pure food laws many registrations have been refused.

The value of this debunking process is equally great to the purchaser and to the manufacturer and jobber. The honest dealer is as much concerned over the quality of his merchandise as the baker who buys it.

# Potent Seed for Rich Fields*

By W. F. Hahn
*Vice-President Continental Baking Corporation*

THIS opportunity of talking to you who have just finished your course of study at the Institute and are about to engage in the application of bread-making theory to the commercial production of bakery products is practically the granting of a wish which I have long secretly cherished but until now without an opportunity to gratify it.

I have read and heard many addresses given on similar occasions to young men who were just about starting their life work, and while I have heard much about character and **more** about service it seems to me that the thought is not pushed back to its ultimate and it sometimes also seems as though successful men, in talking of the reasons for their success, have held something back. Do not misunderstand me. I do not believe they have purposely done this, but it seems to be something of such a supposedly intangible nature and such an intimate part of their individual consciousness that they are loathe to speak of it, possibly because of a feeling of inability to encompass the subject or because of its being apparently such an innovation that there is a fear of ridicule.

It unquestionably has been essential, as is invariably the case, that because of my individual consciousness it was necessary for me to have gone thru right up to the minute and experienced all that I have, yet, it has always seemed to me rather regrettable that although engaged in useful commercial pursuit from an early age, the bigger ideals of life did not really obtain in my consciousness until after practically twenty-five years of business experience, at which time, just about seven years ago, a business connection was made with the men who have been so prominent in the public eye in the last several years because of their organizations of the baking industry along enlarged lines of activity. Naturally, therefore, I have many times desired that those same ideals could have been cognized much earlier in my experience, and possession of those ideals has likewise brought about a desire to speak of them to young men just starting their life work so that they too might have the benefit thereof and at a much earlier point in their business experience. It would seem, therefore, that no apology is necessary for making an attempt to speak to you along such lines.

While I have many times had similar talks with individuals along these lines, my reply to the request to make this talk was that I questioned whether I could give expression to such thoughts en masse, which brought the statement that now was the time to learn of that, and that is one of the reasons for attempting to talk to you along such lines as might possibly be deemed just a little novel. The main reason, however, and of which I wish to assure you, is a desire to be of helpfulness to you and to endeavor to help bring about an inculcation within your conscious thought of the ideal fundamentals which it seems should obtain in all human activity.

There has been so much publicity given to the activities of the baking industry recently that there has arisen in the minds of many the question as to "What it is all about" and that same question arises not only as to the baking industry but thinking men have it also arise when considering human activity generally, and particularly their individual part therein.

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*An address before the Fall 1925 graduating class of the School of Baking of American Institute of Baking.

To achieve anything a man must have a goal, and to set a goal without an adequately proper conception of life and its activity is the sheerest folly and could not be productive of good results. On an occasion of this kind it would certainly not be proper to advocate any denominational ideas as to religious thinking, but in view of the fact that mankind is created in the image and likeness of the Creator, man is essentially a spiritual being. His work is spiritual and his purpose is spiritual; and the misery of humanity in all times has been because of its failure to take due cognizance of spiritual facts.

Any religion is merely a statement of rules for human conduct, and it does not seem so essential that mankind be governed by any one of the various denominational rules of conduct as it is to be governed by the Christian rule of conduct, the principles of which were clearly defined and enunciated by Jesus, the divinely commissioned teacher; and his epitome of all Divine Law was included completely, exclusively, and conclusively in his statement that man should love his God with all his heart, with all his mind, and with all his soul; and his neighbor as himself. That rule of conduct is not complex, neither hard to understand, nor to follow, except when made so by self-limitation, which is the only limitation to which man is subject.

You are about to engage in an industry which, to my conception, is one of the most useful in human activity, and that is the production of bread, which has been advisedly denominated the ''staff of life.'' If mankind is to be provided with a staff of life, the object should be to furnish the very best staff possible. Bread has a spiritual significance. The Master taught that man should not live by bread alone but by every word that proceedeth forth from the mouth of God, and just as bread has been considered the staff of human life, so must the word of God be considered the bread of spiritual being. It does not seem amiss, therefore, that those engaged in the production of bread should have the proper conception of the **real** bread, and thus be enabled to produce a material product in conformity with the spiritual product. That, you will no doubt think, and it is, a very high ideal, but it is not impossible of achievement, and if that ideal governs those engaged in the baking industry the only possible result will be that which is the goal of the organization of which I am fortunate enough to be a member, and that is the very best product at the most reasonable price.

According to my conception, you might practice all of the theory learned in the course taught in this very worthy institute and still achieve no higher position than that of a dough-mixer, which while a very worthy occupation should only be a stepping-stone to more advanced positions in the industry.

''Without vision the nations perish'' is a statement with which all are familiar, and that which is true of nations is true of individuals, and likewise true of corporations, as a corporation is nothing other than an association of individuals. All mankind desires and is entitled to be prosperous, but true prosperity consists not merely in the possession of material things, but in their possession as achieved in real and permanent happiness and contentment, which is the sure reward of those who not only have an adequate conception of life and its work but whose practices conform to Divine Law; and it is more essential that mankind be properly informed of ''Divine Economy'' which governs the spiritual man, than Political Economy, which governs only the material activity of man, the reward for which is only material, temporal, and without personal satisfaction of real happiness and contentment. Therefore, those engaged in the baking industry who desire to occupy a sphere of usefulness and to achieve individual success can only do so by putting into it something which will be of benefit to it, and thus become a valuable factor in its upbuilding, and to do that one must be animated by the common purpose of mankind, which is the reflection of the Creator of whom man is the image and likeness, for it is well known that the purpose of an image is the reflection of its original.

May I briefly outline a thought as to a proper reflection of the Creator. No thinking person can accept a Creator who is not honest, accurate, clean, orderly, active or industrious, kindly or loving, all of which characteristics are accepted generally as so-called virtues, but without any particular understanding as to why, but when mankind is governed by thoughts conforming to those virtues in the understanding that in the practice thereof he is reflecting the Godliness of his Creator, and accomplishing the one and only purpose for which he was created, the expression of Godliness, he is more concerned in the exercise of those virtues and renders service to his God through his service to his fellowmen, which is a larger and more complete thought than that of service to his fellowmen for his own personal interests.

Thomas Edison has said in effect that the most we can do for anyone is to impel him to think. It is not my thought that you will at once accept or approve all of the statements I have set forth, but if it starts your thought along the right lines, the cumulative effect thereof will prove of great benefit to yourself because you will undoubtedly be of great benefit to your fellowmen.

This talk is not intended as a complete thesis on the theory of life, but only as a seed which it is hoped is sown in the fertile ground of your conscious thought, and that it will germinate and be grown to a maturity satisfactory not only to yourself but more particularly to our Supreme Employer in whose service all mankind is engaged, regardless of the individual recognition of that fact or the indifferent service, which, for a time, seems to manifest itself in the experience of all.

## *Cal Cuts the Apple Pie*

CAL COOLIDGE has turned down apple pie. It was to have been an apple pie made by "peaches," too. The Girls' Club of Vermont University offered him one for his Thanksgiving dinner. He refused it coldly, and gave no reason.

What can have come over Cal? Is it modesty, causing him to shrink from public notice? He licks up oceans of maple syrup—and lets the world know about it. He pitches tons of hay before election time and has his picture taken while doing it. He lets it be known that he eats pie for breakfast after the immemorial down-east custom. Then he cruelly cuts apple pie for Thanksgiving.

What can be the reason?

Perhaps he would inculcate the virtue of abstemiousness? Then our retort is the same that was given to his spiritual ancestor: "Dos't think because thou art virtuous there shall be no more cakes and ale? Aye, and ginger shall be hot i' the mouth!" Perhaps he would prejudice the country in favor of New England mince or pumpkin pie.

Something is radically wrong. Mrs. Coolidge ought to have that man's digestion looked into. He shouldn't be begged to eat just one piece of apple pie. He should be coming back for "seconds," if his digestion's all right.

—News-Index, Evanston, Ill.

# Science, Charlatanry and Food*

By H. E. BARNARD

THE science of medicine has made more progress in the last fifty years than in all the previous ages of man. Out of a jumble of superstition and craftsmanship a true science is emerging, exact, efficient, free from the magic and voodooism of the middle ages and now through a definite knowledge of the chemistry of the body cells, prepared to work as successfully in the wonderful laboratory of the human body as the analyst or synthesist works at his research.

And yet at the very time when medicine is becoming an exact science it is confronted by an ever increasing array of cults and quackery. Every contribution to the welfare of the race through the discovery of the x-ray, radium, insulin or the vitamin potency of foods, floods society with ignorant applications to the cure of disease of wholly misunderstood scientific facts. Indeed so far do the misapplications of science in medicine go that often more evil than good temporarily results from sound discoveries of fundamental importance. This is particularly true in the field of nutrition.

### *How to Live One Hundred Years*

Food is an inexhaustible subject of discussion. While man may not live to eat he cannot avoid taking thought of what he does eat at least three times a day throughout his life. From the day the infant leaves his mother's breast his eating habits are determined for him by his parents, his friends, paragraphers in syndicate columns, food advertisements, and a constantly increasing horde of food cults which would have him cast off his bodily infirmities and live to be a hundred by following strange dietary regimes solemnly preached as the only law of life.

Without possessing the slightest real, systematic knowledge of the way the cells of our body function; without an idea as to what nutrition, metabolism or assimilation means in the complex chemistry of life, every one from the waiter who serves our meal to the chiropractor who adjusts our misplaced bones is ready at the drop of the hat to give copious advice on how to live long on some strange diet of raw foods or sterilized foods, on fruit foods or vegetables, on meatless diets and diets rich in protein, on one meal a day or four, on all sorts of diets which are in some way different from the diets Mother Nature has been developing for us through all the years we have been slowly climbing out of primordial slime to rush into battle in a Tennessee courtroom over the constitutional right of a school teacher to tell his students the Darwinian theory.

With the exclusivism that characterizes a scientist pursuing a pet idea or a modern advertiser bent on committing the race to a diet of bran our self-appointed apostles in the wide fields of nutrition maintain that their particular theories are the only sound and infallible recipes for a happy life.

### *The Triumph of Nonsense*

So it is that one school of eating blandly bases its teaching on its assumption that "the first, fundamental, all-important, vital, essential step for efficiency, health and success is intensive nerve nutriment."

Another admits that the basis of its system is not new. "It was ordained in the beginning by an all wise Creator. It was used by primitive man, by Moses, by

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*An address before the Section of Social and Economic Science of American Association for the Advancement of Science.

Daniel, by the American Indian in the prevention and cure of disease.'' And so infallible is the system that, in the words of its proponent, ''When the great epidemic of influenza came on in 1918-19, I prescribed New Orleans molasses, whole wheat and sour fruits as a preventive for several families and was pleased to see every member come through without disease.'' While it is a bit difficult to understand how primitive man, Moses and Daniel could have used New Orleans molasses in treating the ailments of their brethren, it is quite as simple as the analytical process of the child minds who would have us eat nuts to be healthy on the theory that squirrels do not suffer from appendicitis.

And a third well known society of corrective eating advises us that ''the trouble is that certain wrong combinations of good foods simply will not mix in the stomach; instead they set and react chemically upon each other, liberating quantities of gas and acids; they may be said to literally 'explode' within us, then they slowly pass on to the intestines, where they proceed to decompose and ferment.''

### *The Chemistry of Life*

The body of man is an amazing chemical laboratory in which the cells which constitute the mass we know as the human being perform beautiful chemical processes. These reactions are identical with the chemical reactions which in so far as we understand them, we can perform in a test tube. They are motivated in accord with the laws of chemistry and by no other force. Strange combinations of ''seventeen mineral substances'' have no more effect on the chemistry of the body than any other substance which when made available for metabolism plays its proper role in nutrition. But the mere fact that a chemical analysis of the bones, blood, nerves and body tissue shows it to contain certain elements, throws no more light on the relation of those elements to normal life than an analysis of the fused ashes of a Ford car reveals the plan of its maker.

The discussion of the ''law of life'' by those who have no conception of the simplest of the chemical processes of life is an arrogant assumption. Why should one imagine that because his body is a walking chemical laboratory he is qualified to talk about its chemistry any more than he would wish to discuss the problems of a physicist because the matter which composes him consists of electrons, atoms and molecules. Is it to be wondered at that our talk and preachments on natural nutritional law are for the most part pure and unadulterated bosh?

### *A Story of Outlived Fashions*

The history of medicine is but a story of outlived fashions. Through the centuries the usual mode of ascertaining the truth in medicine as in every other profession or industry has been the method of trial and error. It is never safe summarily to repudiate notions even of cranks. To do so may lead us to throw away the baby with the bath. Sometimes the insistence of ignorance leads to truth. And so it is that our knowledge of nutrition, even though it is slowly and surely taking on the aspects of a true science, has grown out of a weird mass of unrelated observations, often misinterpreted and misunderstood.

But a few short years ago we knew foods as compounds of protein, fat, carbohydrates and mineral salts. We knew how much of each of these essentials was needed to do a certain amount of work. We observed that foods low in ash or mineral content produced certain pathological conditions in those whose diet was restricted. And perhaps it was natural enough to assume that when a ship's crew developed scurvy after a prolonged subsistence on a narrow diet the disease resulted from a mineral deficiency in the flour, beans and salt meat ration.

Today, thanks to the intensive work of hundreds of trained students, following the leadership of Mendel, McCollum, Sherman, the Mellanby's and other outstanding biological chemists, we have what has most aptly been called the newer knowledge of nutrition. And many of the guesses and half truths of other times have been replaced by definite fact. We know now that foods must contain something more than protein, fat, carbohydrates and minerals and that certain accessory food substances known as vitamins are necessary if normal metabolism is to take place. It has been said that the discovery of vitamins has not shown us what to eat but rather why we eat as we do. Certain it is that many of our natural preferences for special foods are now explained by the discovery of the vitamins.

### *Building a Rational Diet*

And it is true that as the science of nutrition is developed, means are placed at our hands for building a rational diet which is fitted for its purpose of nourishing the growing child or sustaining the man who does the world's work in field and factory.

If the ration of any class of our people is lacking in any particular it can be corrected, not by advocating any unusual diet nor by condemning foods which have been common in the dietary for generations, but by stressing the need for and safety in the mixed diet which brings to the table in milk and meat, in bread and fruit and vegetables, all the essentials of nutrition in forms which are cheap and wholesome.

Through all the years since shepherds watched their flocks and herdsmen grazed their cattle on the hills of Judea, the human family has depended on mammalian milk for a most essential food. Today cows feeding in innumerable pastures supply the milk, butter and cheese which perhaps better than any other foods round out an adequate ration. And within the last decade the general introduction of more milk into the diet of children has removed one of the chief causes of malnutrition. But while milk may be used in so many ways in the diet a new use is being developed which promises to provide a means for saving hundreds of millions of gallons of fluid milk which now after being separated from its fat at skimming stations goes either to some small use as animal food or as waste to the sewers.

### *Modern Bread a Complete Food*

That new use is in bread. For the baker is watching with keen eyes every development of this newer knowledge of nutrition and he is building into his formulas those essential food ingredients which make bread in very truth the bread of life. And as he adds more and more milk from which but a single constituent, butter fat, has been removed and which will be replaced as a spread when the bread is eaten, he is adding to the proteins and lime and phosphates of flour those so abundant in milk, and also the vitamins which are present even in milk from which its fat has been removed.

And with the change in the composition of bread which has been taking place during the last few years and especially since milk has come to be an essential ingredient of every good bread formula, every cult which has risen to point its accusing though ignorant finger at bread as the arch enemy of the race now finds itself without a single scientific argument on which to base its diatribes against our basic food.

### *Too Much Roughage Dangerous*

It would be a profound mistake to suppose that all the men who have originated cults in the field of nutrition are charlatans. Many of them have been most serious in their advocacies of their unique diets. Indeed, many strange diets do possess virtues for some persons. The constipated are often relieved by eating roughage which is indigestible and so a corrective of their abnormal condition. But to prescribe coarse and fibrous foods to the whole human family because a small percentage of it is benefited by its use is clearly illogical. And in practice it is often disastrous. Dr. Alvarez, speaking recently before the American Home Economics Association, said of the too common use of indigestible foods, "Many of us seem quite to have lost sight of one of the most important factors in a diet and that is its digestibility. Today we often get so interested in supplying vitamins and bulk and iron that we pay no attention to the fact that we are asking invalids to eat some very indigestible things.

"Matters have come to such a pass that it is really difficult now to secure proper food for sick patients in hospitals. The dietitian in charge is generally so impressed with the importance of vitamins and bulk; salads, rough vegetables, fruits and spinach, that no matter how often I ask that these foods be left out, they soon reappear on the patient's tray. I cannot help feeling that much of our present craze for rough foods is a fad—something which we have taken up eagerly but without sufficient study and thought."

To him who cannot tolerate the caffein in his morning cup of coffee some cereal drink which satisfies his eyes and nostrils with a coffee-like appearance and odor while still free from caffein is a most desirable thing. But his improved nervous condition is no reason why he should tell the whole body politic to abandon the cup that cheers and turn to roasted peas. Nor is one man's anaphalactic reaction against steak or strawberries any reason why a sound nutritional habit as old as man himself should be abandoned by the rest of us for a vegetarian diet.

### *Charlatans in Nutrition*

The charlatans in the field of nutrition are those men who seize the half-truths of science or the abnormalities of some small part of the people as a basis for exploiting foods as cure-alls; for condemning one food that a demand may be stimulated for another; for injecting fear and distrust of old nutritional habits in the hope of profiting. The charlatan reads the old admonition, "Let good digestion wait on appetite and health on both," and gives it the reverse English. He pieces together from a weird mass of unrelated facts an absurd theory that the eating of white bread is a cause of cancer and then offers some old bread formula under a new name as the salvation of the race. Or he seizes upon the present day amylophobia or fear of starch as an opportune time to rush to the deliverance of ladies who would retain their girlish figures with an anti-fat bread. The fact that his breads are so nearly similar to all normal breads that the eating of one slice of bread less would be of far more help in warding off obesity does not deter him from exploiting his branny, agar or laxative bread as the only sure foe of fat.

### *The Saving Grace of Humor*

Perhaps the best defense we have against fads and charlatanism is a sense of humor. It is fruitless to argue with a self-appointed prophet; you can only refuse to agree with him. And there is no use in arguing about fads in nutrition. If sound science does not clear away the mist, laughter often will. The pity of it is that laughter within laboratories of nu-

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trition or in groups of dietetic experts so slowly permeates the world outside. But people are now accepting the soundness of the teachings of Mother Nature instead of the strange preachings of misguided fanatics or of charlatans bent on exploiting simple foods as panaceas for human ills and as the truths of nutrition are retold in simple fashion there will be less and less misinformation about food current around the dinner table or printed on labels or advertisements.

No more fitting conclusion can be reached than that so well expressed by Dr. Morris Fishbein in a recent address when he said, "The tendency to attach undue virtues or evils to single factors in the diet has been responsible for much fallacious teaching in public health. Of all of the faddists that occupy the medical scene the food faddists are, no doubt, most eccentric. The physician opposes the promotion of any single article of diet according to 'the all or nothing policy' as the one substance important to health or the control of disease. In efforts at education of the public which the modern physician believes is the most important factor in lengthening the span of life, faddists' notions must be attacked with all the vigor and influence that the scientific pen can command."

## *Starving Pigeons Bad Advertising*

ADVERTISE if you like—but be humane about it.

This is the edict of the Illinois Humane Society, delivered after an inspection of the case of two pigeons, one starved and the other fattened, as a publicity "stunt." The society halted the proceedings.

Complaints flooded the Humane office, and Charles W. Brayne, superintendent, was asked to view the pigeons in their two cages in the Arcadia Restaurant in N. Clark Street. One bird staggered like a wine bibber. Its eyes rolled and Mr. Brayne says it looked as if it might die of starvation any minute. The second one walked like a Charleston dancer and kept its chest puffed out. That one, said a sign, "ate oat-meal bread." The dying one ate white bread—so the sign said.

Dr. R. Baker, for the society, said advertising was fine, but cruelty to living things was carrying it to the extreme.

C. N. Jewitt, cafe owner, said he would do all he could to save the bird. He didn't know pigeons never starved on white bread. But he'd try to resuscitate the pigeon. It took seven hours of delicate feeding with warm milk to bring the bird to the point where it could stand up and give the cafe owner a nasty look.

There were no arrests, Jewitt having kept his promise to Mr. Brayne, and promised never to do it again.

—Chicago Herald-Examiner.

The above interesting news item is worth printing if only to point out once more the stupidity of using birds fed on white flour or bread to prove the inadequacy of such foods for preventing polyneuritis.

It is to be hoped that some day these amateur nutrition investigators will vary their experiments and try to sustain bird life on some other single diet than flour, such for instance as sugar, butter, fruits, vegetables or any other food which is splendidly fitted for its place in the balanced ration but which is not nor never was intended to be a complete food. They will then see that white flour is not the only good food ingredient which is lacking in some of the essentials to adequate nutrition.

And then it may be that some one who is hoping to prove a point in food values will use milk bread as the diet, and confirm the scores of investigations which have shown the completeness of modern milk made bread.

# Billions for Consumers

## *How Government Laboratories Help to Reduce Our Taxes*

THE service laboratories of American Institute of Baking have proved over and over again the value of a careful check-up on the composition of the raw materials and supplies which are used in bakery products or which like gasoline, lubricants, paints and fuels, may vary greatly in quality and value. Not every baker needs a laboratory, indeed only the larger organizations require the constant services of a chemist. But no baker is so skilled in purchasing that he cannot profitably come to the Institute with samples of his raw materials and supplies for an occasional check-up.

One of the most careful of buyers is our own Uncle Sam who buys every year some $300,000,000 of products, ranging all the way from thumbtacks and baseballs to dredging machines and battleships. And when he buys he knows what he gets. He spends about $2,000,000 yearly in carrying on the work of the Bureau of Standards but this investment in chemistry and laboratory control saves him—and us—more than $100,000,000.

### *A Story of Millions Saved*

In the December issue of The New Republic, Stuart Chase and F. J. Schlink tell a wonderful story of how our Government saves money for us and draw some very pertinent conclusions which bakers who are not yet interested in the kind of gasoline or coke or salt they are buying may read with profit.

"For years the government had been buying varnish at $4.37 or thereabouts per gallon. The Bureau with other governmental and industrial experts worked out a specification for varnish which costs $1.44 per gallon. The Navy alone saved $90,000 in buying varnish in 1923. The government buys fountain pen ink for $2.80 a dozen quarts. You will pay $12 to $14 at retail for an ink which is on the average inferior—for you do not buy to specification. The government will buy typewriter ribbons for $1.75 a dozen. You must pay $8 to $10. The Bureau has found that calcium chloride which is commonly used as a base for anti-freezing mixtures, corrodes an automobile radiator in about two year's time, and also encourages ignition leaks. Government cars stick to alcohol and water accordingly. Instead of Dermax for moistening stencils, which costs $3.20 a gallon in wholesale lots, the government uses a compound worked out in its laboratories which costs from **5 to 23 cents a gallon, and is equally good.**

### *Cotton Sacks instead of Burlap*

"Nor is the government always the sole beneficiary of the work of the Bureau of Standards. Recently it helped the cement industry. For years cement had been shipped in burlap sacks, the impression in the trade being that such were stronger than cotton sacking. The Bureau took 300 burlap sacks and 300 cotton sacks, filled them full of hot fresh ground cement and shipped them 200 miles—back and forth, under all sorts of conditions. The cotton sacks came through the racket on top. As a result the industry will probably buy $10,000,000 of cotton sacks, instead of the usual $13,000,000 of burlap, and save $3,000,000 annually.

"The government alone has developed over 11,000 specifications covering, besides foodstuffs, soaps, denims, metal polishes, hooks and eyes, motor boat engines, shipping cases, and so on indefinitely. The total of specifications available from all sources runs to something like 27,000.

"A scientist long on the Bureau's staff estimates that for the $2,000,000 spent annually in testing and research, a saving of at least a billion dollars a year would follow the release of the information to the public at large. The invaluable data which save the government a hundred millions, are not available, in a form that can be used, to that wider body of consumers who pay the government's bills. A consumer can secure a specification by writing to the proper government service, but he cannot secure the results of tests made on products now in the market, and so guide his buying. With the naked specification only, he must hire a chemist or an engineer to find out what makes, if any, meet it. Practically, then the specification can only help the large buyer. Test information is available to state and local governments, but for reasons best known perhaps to their politicians they have not made much use of it to date. As a result some manufacturers of weighing scales and measuring devices, have dumped their rejected instruments into local unpoliced jurisdictions.

### *More Billions Will Be Saved*

"Finally it should be noted that the Bureau has only scratched the surface of the total commodity field. For every product it has tested, there probably remain twenty to which no sufficient tests or specifications have ever been applied. Granting the impracticability of ever—through any agency—testing all, there still remains an immense area susceptible to the methodology, and potential economy, over and above the field now covered by the Bureau. Not one billion, but several billion probably to be saved when the markets of the whole nation are considered.

"Now why precisely does this technique make for savings; what waste does it eliminate? When goods are bought to specification, quality is set; scientifically defined. The buyer knows exactly what he is getting; the manufacturer knows exactly what he has to produce. Competition must then descend from the cloudy heights of sales appeals and braggadocio generally, to just one factor—price. Who can meet the specification at the lowest price? Quality being predetermined, there is no longer any argument as to who furnishes the "best" product—there isn't any best or worst to furnish except as the product may be better than the required minimum for the grade in question. And down the trapdoor goes on all the advertising and all the salesmanship which falls under the general head of persuasion—to use no harsher terms. Down goes the distribution overhead, and with it the cost of the delivered article.

"Secondly, when competition is on price only, a battering ram begins to operate on profit margins. The manufacturer who shades his profit per unit the most, is likely to get the order. Down goes the cost to the consumer again—the maker secures large distribution at a small margin of profit per unit—the Ford-Filene idea. Both manufacturer and consumer benefit.

### *Simplified Manufacturing Saves*

"Thirdly, the manufacturing process itself tends to become simplified. It is no longer necessary to make so many styles and variations on the chance of catching the consumer's eye. 'Special features,' fancy packages, drop out of the picture. One can produce in large units; one has a better chance of 'balancing the load' in plant operation. Thus the concern which now makes the government's ink has divested itself of all snappy executives and expensive trappings, and in a plain but well lighted loft in downtown New York, bends all its energies to making good ink, day in day out, with no fear of seasonal variations, fluctuations, or market upsets during the present contract. Less romance perhaps, but more sound workmanship. With the drop in manufacturing costs, down goes the price again.

"Fourthly—and this is a category of the utmost importance—the consumer, buying to specification, is in a position to buy for a **specific purpose**. If tests have made it clear that a cheaper product or a lower grade or a different product will adequately meet his need, he can buy the cheaper article and save the difference. **He no longer has to protect himself by paying the highest price, fearing that cheaper grades will be adulterated, or go wrong.** How often have you and I paid through the nose because our only test of quality was the highest price in sight? For certain uses, the Society of Automobile Engineers reported that lubricating oil costing twenty cents a gallon was as good as oil at $1.35. It met the specification, and the purpose, at one-seventh the cost. Tests show that certain hardware in ten-cent stores has just as good steel as hardware in stores where the price is two or three times as much. The latter article has a little fancier handle, but for a given use, the tools are identical. Government research finds that for many uses reworked wool has better wearing qualities than all-virgin wool. It finds that certain limestones make better building material for specific uses than sandstones—thus upsetting an ancient dogma. If and when the consumer can be guaranteed by test and specification that the cheaper grade meets his purpose as well or better, down goes the price again.

### *The Burden of Salesmanship*

Fifthly, **buying to specification eliminates all possibility of deliberate adulteration.** It drives the specious, the jerry-built, the actively hurtful from the market. Such products often represent a dead loss of manpower and raw material in the making, to say nothing of the terrific overhead burden of astute salesmanship which now keeps them on the market. In the aggregate this too will operate to lower prices by eliminating waste.

"Now we are in a position to see why the government can buy materials at only a fraction of the cost which the general consumer must pay. The government secures a certain, and on some goods a unique advantage, to be sure, because it buys in large quantities, but over and above this factor, are the five channels of saving enumerated above. **When a specification cut the cost of varnish from $4.37 to $1.44,** the saving had nothing whatever to do with quantity purchases. It was due to the debunking process alone. A group of small consumers buying to specification may well equal one large government purchase, and while the physical cost of distribution to the small consumers must inevitably be more, and so increase the cost somewhat, the larger savings of the five channels are potentially identical for both.

"There are billions to be won if the consumer—both ultimate and intermediate (like the cement industry) — can follow the example of the federal government in purchasing material. Information as to comparative quality—as exemplified in testing automobiles — is one arm of the technique; buying to specifications which flow from tests and research is the other. Who shall conduct the tests, and what are the practicable possibilities of making the method available to the general consumer, will be considered in a subsequent article."

### *Service Laboratories for Bakers*

While readers will wait with interest for the second installment of this money saving and illuminating article no baker need delay putting into immediate practice the suggestion that specifications and analyses will save him a great deal of money. The service laboratories of American Institute of Baking are operated solely for the help of the baker who needs someone to tell him what to buy and whether his purchases are just what he expects them to be. **Are you sure you are buying the best materials at the lowest prices?** You can find out by bringing your inquiries and your samples to the Institute.

## *Secretaries — Front and Center*

THREE essentials of every successful campaign, whether of war or business, are ideals, supplies, and trained organization.

Twenty-five years of purposeful building for public service have established sound principles of business ethics, and the ideals of the baking industry are ready. No longer is it necessary for these to be defended before a hostile public. The baker's friends have proclaimed these ideals for him from the platform of the Buffalo Convention. The private believes in his cause and will fight for it.

For some time our attention has been turned to preparedness in the service of supplies. Great mills, enormous baking plants, small shops and the co-ordinated manufacturing of equipment have established a capacity for production such that the highest quality of healthful food can be supplied to a whole nation. Science and research, information and council, transportation and distribution are standing at the right hand of managers, waiting for orders. Institutes, colleges, schools of baking, association headquarters and leaders in public welfare are ready to act as general staff.

But the industry cannot take the field in a national offensive for better health until its units are organized and trained. Awkward squads are forming here and there, as local bakers clubs, and are drilling in public. State bakers associations comprise whole companies whose captains are the secretaries. On these captains rest the responsibility for training the units in field tactics. The school for secretaries begun at Buffalo, will keep these captains in touch with headquarters plants. More units are needed in every state, and more officers to train them.

"Bakers Associations Secretarial Conference" is the insignia under which all bakers association secretaries are bound together for the exchange of information and the co-ordination of association work. Royal H. Holbrook, educational secretary of the Iowa Bakers Association, is chairman, and C. C. Latus, Secretary the Pennsylvania Bakers Association, is secretary-treasurer. These two experienced generals, enthusiastic in their belief of organization and efficiency, are already hard at work.

The organization of the Baking Industry is now under way, and another year of training will put the army in the field, well prepared to battle for supremacy as the first among the essential foods.

—L. A. R.

## *Tea, Bread and Jam for Oatmeal*

London.—The Scots of the Isle of Skye and the Outer Hebrides have abandoned their traditional oatmeal for a more luxurious diet of tea, white bread and jam.

The authorities of the region are making attempts to introduce easier methods of preparing porridge so that the islanders will not stick to their new tea-and-bread diet simply because it is easier to make ready for the table.

—**The Restaurateur, Dec. 5, 1925.**

# The Present Sugar Dilemma

By C. B. Morison

THE history of science, discovery, useful inventions and technical applications is replete with familiar examples of the difficulties to be overcome when new knowledge presses against tradition. The fermentation of dough by spontaneous leavens was long traditional baking practice. The introduction of yeast into the bakeries of Paris in the early part of the seventeenth century was condemned by the medical faculty of the city at the session of March 24, 1688. They considered its use fraught with danger to the public health, and believed that the citizens should be protected against the mysterious possibilities of an ingredient unhallowed by the sanctity of tradition. In 1670 Paris bakers were restricted to the use of fresh yeast obtained from a Paris brewery, but a ''joker'' was attached to the regulation, requiring that it could not be used unless it was first mixed with the good old fashioned leaven or sour dough.

Today it is generally recognized that the development of a ''compressed yeast'' from selected strains of pure cultures of the organism, especially adapted for use in baking, has been one of the most significant factors in the technical advancement of an industry that was formerly dependent upon impure and unreliable ''leavens,'' ''barms'' and ''yeasts.''

The present dilemma in the sugar situation is a contemporary example of similar interest. The word sugar is conventionally understood to mean the product chiefly obtained from the sugar cane, sugar beet, sorghum, maple and palm. It is identified with the carbohydrate chemically known as sucrose or saccharose. This exclusive denotation of the word has become embodied in the definitions and standards for food products adopted by the U. S. Department of Agriculture for the guidance of officials in enforcing the Food and Drugs Act.

The purpose of this restriction of the term sugar to the chemical individual sucrose is based on the intent of the act to protect the consumer or buyer from deception, since popularly and conventionally sugar is a sweet substance obtained from the source previously indicated.

There are, however, more than thirty other individual carbohydrates that are chemically classified as sugars and among which is cane sugar or sucrose.

This condition is confusing to those who are not familiar with this classification, and becomes still more confusing when it is known that sucrose can be split into two different sugars by acids and enzymes. When sucrose is taken into the body it is broken down by the enzyymes of the intestinal tract into dextrose and levulose, or to use more recent chemical terms, glucose and fructose. A similar breaking down or hydrolysis of sucrose takes place in a fermenting dough with the production of these two simple sugars.

The sugars which are important nutritionally are three simple sugars, dextrose, levulose, and galactose, which is present in milk sugar but is never found free in nature; three disaccharides, cane sugar or sucrose, milk sugar or lactose, and malt sugar or maltose. The three latter sugars all contain the simple sugar dextrose or glucose.

The simple sugar dextrose or glucose is becoming more and more appreciated by the sugar consuming public as a food product of unusual economic importance.

Recent improvements in the process of manufacture have made it possible to prepare from high grade corn starch a highly pure dextrose which is adapted for use in the manufacture of many food products in which the more expensive sugar sucrose was formerly considered necessary.

Starch or corn sugar has been the subject of considerable investigation for the purpose of determining its suitability as a fermentable sugar for use in breadmaking, and many experiments with Cerelose at American Institute of Baking have demonstrated that the results secured are generally satisfactory both in dough fermentation and on the characteristics of the bread. It is not necessary to use sucrose or cane sugar in breadmaking as a source of available sugar to be consumed by yeast activity when a more economical sugar will produce similar results.

The use of dextrose in many other food applications is just becoming to be appreciated and in view of the agricultural situation in the corn growing states has most important relations. The United States today is the greatest sucrose consuming nation of the world with a per capita consumption of well over one hundred pounds per year. The importations of sugar into the United States could very probably be reduced by the utilization of domestic potential sources of corn sugar with probable consequent relief of the present agricultural depression among the farmers of the corn belt.

This thought has been developed statistically by various writers in the newspapers and magazines, and the passage of house and senate bills which are now under discussion should result in clarifying our ideas of what is sugar within the meaning of the Food and Drugs Act.

As previously indicated according to the Federal Standard, the word sugar unqualified means sucrose to the exclusion of all other sugars. The manufacturer of a food product who uses any other sugar is obliged to state it by a descriptive term indicative of its nature. This is not required for bread as F. I. D. 188 permits the use of ''sugar and, or other fermentable carbohydrate substance'' in bread doughs.

In the case of many other products the manufacturer must indicate plainly on the label that sugars other than sucrose are present. This ruling is consistent with the spirit of the Food and Drugs Act, but it carries with it implications that other sugars are ''substitutes'' and of questionable nutritional value. The term ''glucose'' especially, which in itself is an innocent chemical term, is connoted in the minds of some, who still survive among us, as a highly vicious adulterant, the use of which is responsible for various nutritional evils from dyspepsia to diabetes.

As a matter of fact, physiologists tell us that probably more than half the energy in the average diet is derived from glucose, that the three sugars, cane sugar, malt sugar, and milk sugar are all sources of glucose and that the starch of our foods is finally converted into glucose and absorbed.

Glucose is the most important sugar nutritionally and it is therefore of obvious importance to remove from the public mind the lingering odium attached to it as a compound of questionable use.

The early ''glucose'' products and the seventeenth century yeasts are not comparable with their descendants of today. Continued scientific research has made it possible to provide the baker with pure yeast, and the sugar chemists and technologists have succeeded in preparing glucose from corn starch of the highest purity in a form comparable to that of cane sugar.

The future will probably see the production of levulose or fructose, the sweetest of all the food sugars on a commercial scale. This simple sugar may be prepared from the Jerusalem artichoke, a plant which can be grown without difficulty in various parts of the United States. When this time comes the sugar dilemma of definition will be further complicated by the commercial availability of both glucose and fructose, the two simple sugars which result from the hydrolysis of cane sugar.

The impact of another simple sugar upon a system of definitions and standards based on the premise that sucrose alone is sugar will be followed by further confusion and misunderstanding. It is thus important to determine whether adherence to an inflexible system of definitions in the interest of consistency is fair to the development of our potential agricultural, manufacturing and food resources of immediate and future importance. A revision of our ideas on what is sugar should be possible so that the mutual interests of all may be recognized and protected.

## *Politics and Food Inspectors*

WHEN our pure food laws were enacted conditions were so deplorable that the public had a real concern over their enforcement. It had reason to be when nine out of every ten samples of spice were fraudulent, when cider vinegar was commonly made from corn instead of apples, when Vermont maple sugar never was nearer a maple tree than the flooring of the loft in which some cheating adulterator boiled up a mass of brown sugar and flavored it with a decoction boiled out of corn cobs. Conditions are different today. Our food supply is for the most part free from fraud and honestly labelled. This is largely due to the fact that the Federal Government protects the quality of all interstate shipments of foods. Within the states conditions are not so good. And in some large cities the simplest sanitary regulations for the protection of foodstuffs in restaurants, groceries and bakeries are either ignored or forgotten. These conditions have been studied for the past year by the National Civic Service Reform League and in view of the genuine interest of the progressive food handler and manufacturer the following news item is well worth careful thought. When politicians endeavor to take over the control of such scientific work as that of the food inspector it is high time the food industries rallied to the support and protection of the public.

"After a year's study of conditions throughout the country, the National Civic Service Reform League announced tonight that food inspection in the United States was "practically negligible from a public health standpoint."

The league said it found the inspection was being done in many instances "by plumbing inspectors, sheriffs and petty politicians, who were unable even to suspect — much less detect — modern methods of disguising bad food."

More than half the inspectors in the states and cities covered by the investigation, it explained, went into their positions "without adequate training or experience."

"The trusting confidence of the American public in the efficacy of laws," the report said, "was never more clearly shown nor more grossly betrayed than in the matter of food inspection.

"We have enacted 'pure food' laws and ordinances, therefore, presumably we have 'pure food,' but between the law and the pure food lies a most important, though seldom recognized factor—the human element charged with the interpretation and the administration of the laws and ordinances."

—Indianapolis Star, Dec. 21, 1925.

# Common Salt

## *Its Composition in Relation to Effects on Bread Characteristics*

By C. B. Morison and M. R. Reeser

COMMON salt is an essential ingredient of most bread formulas and has been used by bakers for centuries. The purity or grade of salt is generally recognized as being of considerable importance in relation to its suitability for use in baking and other food industries. In butter-making especially the use of a product low in certain kinds and amounts of impurities associated with sodium chloride is necessary to avoid an undesirable influence on flavor.

In the salting of fish and meat, the choice of a suitable grade of salt is important, as the presence of calcium and magnesium ions appears to exert a retarding influence on the rate of penetration of sodium chloride into the tissues.

The selection of common salt for baking purposes is a subject of frequent discussion which has complicated aspects also. These are, stated in general terms, effects on fermentation, the properties of ''gluten,'' and especially the taste of bread.

Manufacturers and distributors of salt for use in baking, make claims for their products in all these connections, but particularly in regard to the effects of salt on taste.

The claim is made that the presence of certain ''bitter salts'', such as calcium chloride, magnesium chloride and magnesium sulfate in the salt used for bread-making will exert a highly undesirable influence on taste. They offer, however, no quantitative data on this claim which is available for reference, and the grade or purity of salt which might produce an undesirable taste becomes a matter of speculation.

It is therefore important to attempt to determine what degree of purity of common salt is required for use in baking, since a very high grade of salt is expensive in comparison with a lower grade.

The difference in cost between several grades of salt is important also in relation to production charges, as the use of a product of reagent purity is not necessary unless justified by commensurate quality effects in proportion to the extra costs for ingredients.

The necessity for a high grade salt for domestic and dairy purposes is recognized by the Federal Standard for salt, which is as follows: ''Table salt, dairy salt, is fine-grained crystalline salt, containing on a water free basis, not more than one and four tenths per cent (1.4%) of calcium sulfate $CaSO_4$) not more than five-tenths per cent (0.5%) of calcium and magnesium chlorides, ($CaCl_2$ and $MgCl_2$), nor more than one-tenth per cent (0.1%) of matters insoluble in water.''

Our analyses of brands of salt used in the baking industry, and received from manufacturers, distributors and individual bakers have in general conformed with this standard, and in most cases have shown much less than 0.5% of calcium and magnesium chlorides.

The sodium chloride has ranged from 97.45% to 99.94%. Common salt containing over 99.5% sodium chloride is readily obtained, and a commercial product is available of very high purity, 99.9% sodium chloride, being guaranteed by the manufacturers.

Inorganic compounds associated with sodium chloride in common salt are usually calcium chloride, calcium sulfate, magnesium chloride, magnesium sulfate, iron and aluminum compounds, and sometimes calcium and magnesium carbonates, calcium phosphate and silicates.

The addition of carbonates, silicates and phosphates as drying agents for the production of a "free running salt" for domestic purposes is not required in salt intended for use in baking. Brands of salt containing added material must be plainly labelled in order to indicate its presence in compliance with the food laws.

The amounts of calcium chloride found in samples of common salt examined at the Institute laboratories ranged from 0.01% to 0.15%, and the amount of magnesium chloride from 0.00% to 0.14%. The presence of these amounts of "bitter salts" in samples of salt used in various baking tests did not indicate any effect on taste that could be detected. It was therefore thought advisable to carry on a series of baking tests for the purpose of determining if higher amounts of calcium and magnesium chlorides associated with sodium chloride would confer a bitter taste on the bread. A 10% solution of sodium chloride and 1% solutions of calcium chloride and magnesium chloride respectively in distilled water were prepared from pure analyzed reagents. A baking test formula was used for the preparation of the doughs based on that employed at the American Institute of Baking, except that the total salt was maintained at 1.75% on the basis of flour taken as 100%. This formula was as follows:

| | |
|---|---|
| Flour | 325 grams |
| Water | per absorption |
| Sugar | 10 grams |
| Yeast | 8 grams |
| Salt | 5.6875 grams, or 1.75% |

The total amount of salt or salts required for the series of tests was added to the doughs in the form of the solutions previously mentioned, 10% sodium chloride, and 1% calcium chloride and magnesium chloride respectively. The amount of water added from these solutions was taken into account in relation to the total water required by the flour according to the absorption.

Three series of baking tests were made, (1) sodium chloride and calcium chloride, (2) sodium chloride and magnesium chloride, (3) sodium chloride, calcium chloride and magnesium chloride.

Series 1 consisted of six doughs which contained 1.75% of total salts on the 100% flour basis, constantly increasing amounts of calcium chloride and decreasing amounts of sodium chloride as follows:

| | Sodium Chloride | Calcium Chloride |
|---|---|---|
| Dough 1 | 100.0% = 5.6875 grams | None |
| Dough 2 | 99.8% | 0.2% |
| Dough 3 | 99.6% | 0.4% |
| Dough 4 | 99.4% | 0.6% |
| Dough 5 | 99.2% | 0.8% |
| Dough 6 | 99.0% | 1.0% |

The bread baked from this series of experiments did not show an appreciable bitter taste below Dough four, corresponding to 99.4% sodium chloride and 0.6% calcium chloride. The bitterness of taste seemed intensified in Doughs five and six.

Series 2, was similar to series 1, except that magnesium chloride was substituted for calcium chloride.

| | Sodium Chloride | Magnesium Chloride |
|---|---|---|
| Dough 1 | 100.0% = 5.6875 grams | None |
| Dough 2 | 99.8% | 0.2% |
| Dough 3 | 99.6% | 0.4% |
| Dough 4 | 99.4% | 0.6% |
| Dough 5 | 99.2% | 0.8% |
| Dough 6 | 99.0% | 1.0% |

There was no indication of bitter taste in the breads baked from this series of experiments except in Dough six which would correspond to salt containing 99.0% sodium chloride and 1% magnesium chloride.

Series 3, consisted of six doughs containing the same amount of sodium chlor-

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ide as in series 1 and 2, but with amounts of calcium and magnesium chloride as follows:

| | Sodium Choride | Magnesium Chloride | Calcium Chloride |
|---|---|---|---|
| Dough 1... | 100 % = 5.6875% | None | None |
| Dough 2... | 99.8% | 0.1% | 0.1% |
| Dough 3... | 99.6% | 0.2% | 0.2% |
| Dough 4... | 99.4% | 0.3% | 0.3% |
| Dough 5... | 99.2% | 0.4% | 0.4% |
| Dough 6... | 99.0% | 0.5% | 0.5% |

No appreciable bitter taste was observed in bread baked from any of the doughs in this series.

The results of these experiments indicate that the amounts of calcium chloride and magnesium chloride associated with sodium chloride in common salt, according to our analyses would probably have no appreciable influence on producing a bitter taste in bread.

The maximum amount of calcium chloride found in samples of salt was 0.15%, and of magnesium chloride 0.14%. The Federal definition for table or dairy salt requires that the calcium and magnesium chloride shall not exceed five-tenths (0.5%) of these constituents.

It is thus evident that salt which complies with this standard in respect to the permitted amount of calcium and magnesium chlorides, is suitable for use in breadmaking.

While the series of baking tests reported were concerned primarily with influence of the presence of "bitter salts" on taste, the mixing fermentation, proofing and baking data was recorded and the resulting bread scored and the volumes determined.

The baking data indicated a tendency toward a slight decrease in the fermentation period of the dough, and a pronounced increase in loaf volume of the resulting bread when higher amounts of calcium and magnesium chloride associated with sodium chloride were present. The average score of the bread in Series 1 was 89.8, Series 2, 90.6 and in Series 3, 92.2.

## *Suggestions for Pie Bakers*

"STELLA KING Wins Apple Pie Crown" is the title of a story about the **first annual** pie baking contest recently featured at the National Restaurant Association convention in Detroit. The restaurant association knows that good pies attract trade, and capitalizes this interest.

Now, we ask, why do the restaurant owners promote the baking of pies in their own kitchens? Is it because they can produce a better pie cheaper than the specialized pie bakery?

The editor of American Restaurant comments as follows: "The N. R. A. are to be complimented upon their endeavor to create greater interest in pie baking by restaurants. We have always maintained that public eating places should do their own baking, for only in this way can individuality be built."

It is interesting that apple pie was chosen for this contest, for in a check-up of several hundred restaurants, we find apple pie always the leader.

In this first contest the actual cost of ingredients was twenty-five cents for the winning pie, but nothing is said of other costs. The figures, and formulae from the commercial pie baker would have been interesting by comparison to the restaurant owner. And that brings us to the observation that there are many commercial pie bakers whose pies will rank high in such a contest, were they entered.

It is such tendencies as these that are food for thought to the foresighted baker of pies who is strengthening the foundations of his business, and insuring the future. Those are the men who will answer roll call at Chicago, February 22 and 23, when the pie bakers gather in their own special conference at American Institute of Baking. They will find there answers to many questions, and listen to discussions on production, ingredients, machinery, and advertising of pies.

# *A Chemist's Report*

ONE of the valuable right arms of our many armed government reaches out to enforce the food and drugs act by which for nearly twenty years the consumer has been protected against misbranded and adulterated foods and drugs.

The annual report of the Bureau of Chemistry is an illuminating document which should be read by everyone who is concerned with the production of foods. One of the most valuable studies of the past year has to do with the nutritive value of the proteins. It has long been known that proteins which are lacking in the amino acids are of little or no value in promoting the growth of young animals or in maintaining normal conditions in adults. The determination of the protein content of a food is therefore of relatively little value unless at the same time the types of amino acids present are known. A paper on the tryptophane and cystine content of various proteins, based on extensive chemical research work in the bureau of chemistry, gives for the first time the percentages of these amino acids in a large number of proteins.

A continuation of the studies on the proteins of wheat bran has shown that they differ in composition from those of the endosperm, which constitute the proteins of white flour. The bran proteins, in contrast to the wheat endosperm proteins, are characterized by high percentages of the nutritionally essential amino acids. The bran albumin contains 4.76 per cent of tryptophane, the highest found in any plant protein hitherto reported; and the globulin is correspondingly high in the basic amino acids. These findings are of particular value, because the proteins of the wheat endosperm are deficient in these very amino acids. Approximately 22 per cent of the protein of the wheat kernel lies in the seed coats, or bran. The value of wheat bran as a feed for animals has been long recognized by husbandrymen and practical feeders of farm animals, but very little work has been done heretofore to determine the value of its proteins by carefully controlled scientific experiments.

It is planned to study the supplementary value of the bran proteins when fed with certain other proteins deficient in those amino acids which the bran contains in relatively large quantities.

Results of the year's study on the composition of alimentary pastes and the raw material used in their manufacture were published. Work on the moisture content of flour was continued.

A study was begun of the changes in the fat characteristics of cheese brought about by the ripening processes. Methods for the determination of moisture in milk powder were studied, and data on jams, jellies, and preserves were collected. Reports on baking powder, cereals, eggs and egg products, and fruit and fruit products were made to the Association of Official Agricultural Chemists. Assistance was rendered in the development of a standard experimental baking method for hard wheat flours for the purpose of unifying and standardizing experimental baking tests now in use and making possible a comparison of results.

The tables showing the number of prosecutions brought for violation of the Food and Drugs Act list 746 prosecutions and 910 seizures of illegal products. Included in the list are references to four prosecutions relating to baked products; three prosecutions and 11 seizures because of the presence of excessive water in flour; 20 prosecutions and 37 seizures of jellies which might in some cases have found their way into the bakery. Other cases handled had to do with eggs, dried fruits, nuts and other materials which enter into baker's products.

# Bread and Civilization

## *How Bread Acts as a Barometer in Telling the Story of Mankind*

By Mrs. D. F. Stevenson,
*President of the Dante Circle of Atlanta*

BREAD, aptly termed the "staff of life," is also a barometer for civilization.

Persons in the United States are just beginning to appreciate the extreme importance of bread as a food, but only very few are aware of its significance in marking the development of the human race.

History shows repeatedly that the humble loaf of bread, which is taken into the home in the most matter-of-fact manner, has been the hand-maid of civilization through the ages.

Wherever civilization laid its hand, bread has been with it. In the lands where civilization made marked progress through the various centuries, bread has been consumed in large quantities.

Bread-making is the most ancient of human arts. It marked man's first efforts to obtain a diet of prepared foods—a step which signaled his departure from the lower animal stage of eating far back in the Stone Age.

Calcined remains of coarsely-ground grain cakes have been found in Swiss Lake dwellings that date back to the Stone Age. The cakes, which would shock the housewife of today, were made of different kinds of grain, barley and one-grain wheat being among the ingredients.

There were no bakeries making bread for Mrs. Stonewife. She did not even have the opportunity of buying bread-making material in meal form. To obtain her "daily bread" she was compelled to crush grains between some hard surface. Stones, round-shaped ones, were used to mash the grain against other stones with more or less concave surfaces.

Then came the baking—baking without ovens. This was accomplished by laying the dough in a convex-shaped stone, which was heated, and covering it with hot ashes.

Bread was at the heels of civilization when it made big steps among the ancient Egyptians. They made bread from wheat, spelt barley and durra, kneading the dough with their feet.

It is also almost certain that white bread made its initial appearance in Egypt, being a food that only the very wealthy were able to obtain. Loaves of bread in those days were small and round, resembling to some extent the shape of the present-day muffins.

Egypt became the wheat-growing center of the world and biggest bread-consuming nation during the golden age of the Pharaohs. When this once-powerful nation ceased to progress it was quickly reduced to the present stage, where it grows less wheat and possibly consumes less bread than scores of different states in this country.

Scientists found stone ovens for baking bread in virtually every home in the ancient cities of Chaldea. Close by the ovens were grinding stones used to make the meal.

When the tide of civilization swung westward to Greece and Italy, bread went with it, becoming a big factor in the diet of the classical Greek and the fast-growing Romans.

When the Romans became the progressive race of the world they turned more and more to bread as a daily food. But it was not until 171 B. C., after the war with Perseus, that they were first introduced to the public baker, who today plays such an important role in furnishing bread.

Bakers in the days of the Romans employed slaves to do the arduous task of grinding grain for bread.

Records of the royal household of England are full of interesting facts about bread, how it was sold and how the trade was regulated. "Manchet" or "Paindemayn," we find, was the highest class of bread. It is of interest that modern bread is better bread, lower in price, and is available for everyone, while in those old days only the nobles enjoyed the good bread.

Bread Street in London was the regular bread market, and in 1302 the bakers of London were forbidden to sell elsewhere. In 1307 the Bakers' Guild was formed, showing that in the fourteenth century baking was a recognized craft. All through Europe, too, for centuries the bread supply has come from bakeries.

Civilization and bread, hand in hand, continued the westward movement through the middle ages when England, France and other countries in Western Europe began to lead the progress of man. France, today, is the greatest bread-eating nation of the world.

Still, on its westward flight, civilization and likewise bread-eating, reached to America. In this continent, both civilization and bread made their great development, particularly during the last twenty-five years.

Recent inventions and scientific discoveries brought bread to its present high state of perfection. The greatest triumph was the automatic bread-making plants, which manufacture bread that is untouched by human hands and absolutely pure, uniform, nutritious and wholesome.

The United States, like other nations which led world progress, is rapidly growing into a big bread-eating country. Persons are awkening to the importance of bread as a food, which was so forcibly emphasized during the war when wheat and wheat flour had to be conserved to feed the world. Since the war, more bread is being consumed by Americans than ever before.

It is said that history repeats itself. If that is true the growing bread appetite of the United States augurs well for its future progress as the leader of civilization.

Besides, bread is the food for muscle, bone and brain. Scientists have ascertained that it is the most wholeome, nutritious and economical of all foods. Its exponents now say "Eat Bread—more Bread."

Whereas the bakeries of European countries for centuries have made all the bread for their peoples, we observe that bakeries in the United States are just

Bakeries in the United States are just beginning to assume the role of supplying all of America's bread. People are being educated in bread, in its nutrition, its economy, its deliciousness. They are beginning to give bread a more important place on their tables.

There is no doubt that bread-eating will increase here. America now has the finest bakeries in the world, skilled bakers and the finest ingredients to put into the bread. Our bread is the best that can be produced. America is indeed fortunate in having such a blessing, and it is the duty and the privilege of everyone to eat more bread.

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"Keep him at least three paces distant who hates bread, music and the laugh of a child." —Lavater.

# *Influence of Storage on Composition of Flour**

HIGHLY milled flour made from sound wheat can be stored in dry rooms free from odors for at least four years without deteriorating. During the same length of time, on the other hand, and under the same conditions, poor grade flours or whole wheat flours deteriorate. This conclusion is reached by J. E. Greaves and C. T. Hirst in Utah Experiment Station Bulletin 194, "The Influence of Storage on the Composition of Flour," which is just being distributed.

The general belief among millers, bakers and the laity that flour improves on aging, prompted these investigations which have been in progress since 1921. An attempt to find the basis for this belief revealed the fact that "there is no definite information as to the time requisite for this improvement nor whether it reaches a maximum and then deteriorates. The information is no more exact as to the changes which occur during the aging process or the conditions which govern them."

Seeking facts on these phases of the subject, Greaves and Hirst in 1921 selected various samples of flour milled from new wheat and stored them in a mouse proof case with glass doors. The flours were analysed when first obtained and also at the end of one, two and four years. Standard methods of analysis were used throughout.

From the results recorded from these analyses, the investigators feel justified in concluding that highly milled flour made from sound wheat can be stored in dry rooms free from odors for at least four years without deteriorating, while poor grade flours or whole wheat flours under the same conditions for the same length of time deteriorate. How much longer than four years the high grade flour might be kept before deterioration would set in, if at all, has not been determined.

As to the changes which take place during storage, the results show:

"The moisture content of the flour slightly decreases due to storage. It reaches a constant in both wheat and flour of approximately 8 per cent in this district.

"The water-soluble phosphorus progressively increases due to storage, whereas the alcohol-soluble phosphorus probably came from the enzymic splitting of the phospholipins.

"The hydrogen-ion concentration in every flour first decreased and later increased. It is suggested that this decrease is due to continuation of the ripening process well over into the storage period. Later as deterioration commences there is an increase in the hydrogen-ion concentration of the flour.

"No evidence was obtained by the Sorenson titration method that protein cleavage occurs during storage.

"The soluble carbohydrates increased progressively during the storage period.

"The water-absorbing powers of all the flours increased as did also the flavor and texture of the highly-milled flours during storage. Storage increased the breadmaking properties of the flours. The time necessary for optimum benefit to result depends upon the flour."

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*An abstract of Bull. 199, Utah Exp. Sta.

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"God grant me bread with eyes and cheese without them."

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I can't understand how you can improve your Baking Technology. I am always glad to have it; I read it; I enjoy it and it must be a very welcome publication to thousands of bakers all through the land.

A. M. G. Soule, Chief, Division of Inspection,
Maine Department of Agriculture.

# Books for the Baking Laboratory

THE MEDAL OF GOLD, by William C. Edgar, 373 pp., Illustrated, The Bellman Company, Minneapolis, 1925. Price, $2.00.

Those who found in The Bellman a wealth of good literature lamented its passing. They will eagerly read The Medal of Gold which bears the imprint of The Bellman Company and which has been written as a story of industrial achievement by the editor who made the magazine a treasury of poetry and prose.

The first Washburn flour mill was built at the Falls of St. Anthony in 1866 and then began the development of the industry which before the close of the century made Minneapolis the milling center of the world.

The author has made of his book more than a story of the growth of a firm of flour millers for he has woven into it the history of a great state and pictured the role the families of Washburns, Crosbys, Dunwoodys, Bells and other builders have played in its political and industrial development.

From the intimate knowledge acquired through many years of service as editor of The Northwestern Miller and friend of all the men who built their reputations into the firm whose product carries the Gold Medal brand into every corner of the world, he has traced the application of improved milling processes to the production of finer and finer flour and outlined step by step the growth of an industry which plays so important a part in feeding millions of people.

The Medal of Gold devotes many pages to showing how the firm built for and with its employees, how ill-advised strikes and boycotts were settled with honor to the company and so satisfactorily that for more than twenty years the Golden Rule has determined the relations between employer and employees. The chapter devoted to the history of these relationships may well be studied by those interested in employee organization.

During the years of the Great War the firm of Washburn and Crosby placed its full resources of men and milling abilities, first at the service of humanity in its efforts to relieve the distress of suffering non-combatants and then at the command of Herbert Hoover. James Ford Bell became the chairman of the Milling Division of the Food Administration and as the representative of the entire milling industry did a splendid service for his country, his industry and the people of the allied nations.

The conclusion to the book might well be quoted in its entirety for it not only most worthily sums up the material accomplishments of a great company of millers but it sets up a philosophy or code which could advantageously be followed by every man in business. The final sentence of a noteworthy contribution to the literature of American industry reads: "Wise and farseeing and possessing an innate sense of the true and fundamental meaning of all human effort, the great founder expressed in one sentence the thought which sustains and ennobles all work, when he caused to be carved upon the stone walls of his mill the sentence: 'Labor, wide as the earth, has its summit in Heaven.'"

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SIMPLE BUT EFFECTIVE CAKE DECORATING, by Dennis M. Hopkins, 143 pages, Illustrated, Bake Shop Library, Bakers Helper Company, Chicago, 1925. Price, $4.00.

It is hardly necessary to say that the author is a widely known expert in the cake and decorative end of the baking industry. For some time past he has contributed much information in this particular phase through Bakers Helper.

The book covers the main points of decorating throughly with numerous illustrations, thereby enabling the beginner to follow the text closely and accurately. For the experienced baker many short methods and time saving suggestions are given which should be appreciated since present day competition does not permit an excess of time in the decorating of the average commercial cakes.

A complete list of the necessary tubes and other equipment required for decorating is given as well as the care and correct tools to be used with subsequent steps in the making and completion of various designs and numerous flowers as elucidated by many exercises throughout the book.

A multitude of subjects are discussed, such as all classes of icings with recipes, colors, medallions, marzipan, special moulds, floral decorations, etc. Of the many subjects given, one worthy of mention is that of cake making and recipes, including such items as cake material and functions, correct methods of compounding and baking of various cakes. The cake recipes are numerous and cover a wide range.

The book is written in such a way that the beginner should have no difficulty in the interpretation, and a practical baker will find it helpful.

—W. W.

## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Whole and skimmed milk powders as food.** L. T. Anderegg and V. E. Nelson. Ind. Eng. Chem. 17, 451-5 (1925).—Whole milk powder properly supplemented with Fe citrate and carbohydrate or Fe citrate alone furnished all the elements essential for growth, reproduction and rearing of the young of white rats. The relative amounts of protein, fat and salts decidedly influenced the nutritive value of the ration. Incomplete results indicate that addition of Fe citrate has marked effects on reproduction. If proved impossible with skimmed milk powder so supplemented as to conform in composition with a whole milk powder diet, to obtain results favorable for growth, reproduction or rearing of young. The addition of either yeast or wheat embryo to a skimmed milk powder diet, on which there was no reproduction, changed it so that the young were born and reared by the first generation; the second generation on these experiments grew normally but did not reproduce. Yeast and wheat embryo must therefore be furnishing the same supplementary substances.

H. B. Lewis.

**Production and nutritional value of commercial wheat germ extract.** Chas. Hoffman. Ind. Eng. Chem., 17, 498-503 (1925).—An extract of wheat germ, heretofore a waste product, has been prepared commercially so that the content of vitamins B and X, and the proteins has been retained. The toxic wheat germ oil is removed in the process. The product contains carbohydrate 76.09, protein (NX 6.25) 15.36 and ash 5.05% and is well balanced biologically, the main deficiency being Ca. The true protein content was only 4.5-6.5%, the remainder of the N being present as nucleic acid and amino compounds. White rats grew normally on a diet containing only 4.1% true protein from this source. Satisfactory reproduction was obtained on diets containing this wheat germ extract as the sole source of vitamin X.

H. B. Lewis.

**The bread making value of wheat flour.** Bernard D'Arbouet. Chimie et industrie 14, 21-8 (1925).—Review of the methods of determining it, more particularly of the Boland aleurometer, of the Chopin extensometer and of the pH determination.

## *Patents*

**Food product rich in vitamins.** C. Hoffman, H. D. Grigsby and N. M. Cregor. U. S. 1,541,263, June 9. Raw materials such as rice polishings, wheat bran or cereal germs are cooked until the starch which they contain is gelatinized, the gelatinized starch is saccharified by malt diastase and the material may also be subjected to the action of proteolytic enzymes. The product is rich in $H_2O$-soluble vitamin B and may be used as an ingredient of bread or other foods.

**Testing yeast in making bread dough.** H. J. Lueders. U. S. 1,539,751, May 26. A dough mass is made of a definite quantity of yeast to be tested and other dough ingredients and this dough specimen is immersed in $H_2O$ or other liquid. An apparatus is arranged automatically to record the lapse of time before the specimen expands sufficiently to float in the liquid.

**Bleaching and otherwise improving flour.** E. C. Sutherland. U. S. 1,539,701, May 26. Flour or similar milling products are improved as to color and baking properties by treatment with a very small proportion of benzoyl peroxide or other organic "peroxidized compound", the action of which may be further augmented by ultra-violet rays.

**Food composition for use in baking, yeast manufacture, etc.** J. A. Wessener, U. S. 1,526,032, Feb. 10. Steep $H_2O$ such as is obtained from the steeping of corn in starch manufacture containing 15-18 lbs. of solid matter and having a concentration of 55-58%, is mixed with compressed yeast containing 5.8 lbs. of solids and "having a concentration of 13%," (or an equivalent amount of autolyzed yeast) and with tri-Ca phosphate 15 lbs. and FeCl 2 oz. (Di-Ca phosphate or $CaSO_4$ or $CaCO_3$ may in some cases be substituted for tri-Ca phosphate.) This mixture is evaporated at a temperature of about 40-60° to obtain a dry product which is non-hygroscopic and which may be used as a vitamin-containing food for human consumption or, with the omission of the yeast if desired, as a yeast food for the manufacture of yeast.

**Conditioning flour, etc.** R. Hutchinson. Brit. 228,829, July 30, 1923. Wheat, wheat flour or the like is "aged" to increase the "gluten strength" by heating to over 50 degrees (e.g., at 80–100 degrees), until the gluten is so affected that it would be washed away with the starch in a washing test, cooling, and then mixing with over 15% of untreated grain or flour.

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## The Earnings of Research

IT HAS been estimated that because so few of those who study science are competent to advance its borders, that a man equipped to contribute original knowledge to humanity costs $500,000. The estimate has been quoted with approval by Arthur D. Little, former president of the American Chemical Society.

Hoover's estimate is that there are not more than 5,500 men in the United States engaged in pure scientific research. Society has therefore invested approximately less than three billion dollars in the nurture and equipment of the sort of men who are primarily responsible—with their predecessors for a century or so—for an annual income of 45 billions.

A hint at least of how to increase national and individual wealth and well being may be had when we note the small amount of resources and money at present devoted to such researches.

The whole income available for investigations of pure science is figured at about $10,000,000 per year. Technical, professional, and agricultural schools, government bureaus, experiment stations, and industrial laboratories devoted to the application of the truths discovered at a cost of $10,000,000 per year have available more than $200,000,000 per year.

Against 5,500 researchers in the nature of things we have 30,000 men studying how to apply their discoveries to practical purposes.

The number of laboratories devoted to making practical use of previously discovered scientific laws has increased 500 per cent in the last ten years.

No such increase has been recorded in the equipment of original scientific exploration.

Not only are we neglecting our chance to invest heavily in the surest means of increasing social wealth, we are penalizing by our tax system the scientific discoverer who may turn his discoveries to account.

Income suddenly realized after years of investigation is taxed as if it were all made in a single year—after realization.

Every waking and sleeping moment of the American citizen today is crowded or guarded by the gains of scientific research. The heating, housing, and ventilating environment of the deepest slumber are from the brains and workshops of men who have studied heat, gas, and organic chemistry from Dalton and Tyndall's day to ours.

Pasteur is back of Florida real estate. Miami could not have been thrown together except to be destroyed by epidemic, had it not been for that Frenchman. Chicagoans now building up the coast of Mississippi sound are buying into what was an eight months region for the white man, before the days of Gorgas, Wood, and others who conquered Yellow Jack and got a stranglehold on malaria.

Dr. William Mayo recently pointed out to a Chicago audience that 75 per cent of human energy is used up in heating and bodily work, over which the individual will has no control. Scientific law is being followed in the provision of diet, drink, clothing, shelter, and respiration, until we can foresee the day when three-quarters of our life effort will be conducted along scientific lines, whether we will or no.

—**Harper Leech, in The Chicago Tribune.**

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We have a number of baker customers whom I am sure would like to know about your Institute, as well as ourselves. If you will kindly give us full information regarding your system of helping bakers we will be glad to pass it along to some of our customers. They all need help at times.

—**Homer J. Mickey, Superintendent,
Gibbon Roller Mills, Gibbon, Neb.**

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BAKING TECHNOLOGY

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# Human Experiment Stations

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FOR fifty years and more experiment stations have developed and directed our agricultural activities. In their laboratories new fruits and grains have originated, scientific methods of fertilizing soils and cultivating crops have been worked out to increase production, and the breeding and feeding of animals has been developed so successfully that no modern farmer varies his plan of raising and maturing his beef or dairy cattle, his sheep or hogs from the methods devised by experts.

There is no guess work in the rationing of well bred livestock. Every bushel of corn fed is expected to produce the maximum poundage in pork and the ration of a dairy cow is calculated to turn high protein feeds and carbohydrates into milk and butter fat with minimum waste in the process.

All the science of chemistry has been brought to the solution of the farmers' problems. Every forward step in nutrition has been promptly applied to animal feeding.

But no such scientific control has been applied to the feeding of the human family. Facts which have been recognized as necessary to the operation of a profitable dairy have as yet never been translated into terms applicable to the children and adults of the dairyman's family. That is why more than fifty per cent of our school children are undernourished and why even in the country child life is far less well cared for than the livestock in the farmyard.

This strange and illogical situation is usually explained by the statement that the result of the proper feeding of beef cattle or dairy cows is directly reflected in increased income while the feeding of the family around the dining table is a matter of personal preferences, convenience and cost.

### *Science Also Helps Human Family*

If this is true it is high time experiment stations were established for the study of the nutrition of the higher animals known as human beings and the methods which have been so successful in the barn brought into the home.

Of course the splendid work which has been done in scores of Home Economic Departments, in modern hospital practice, and in children's clinics has contributed a great deal to our knowledge of the proper method of feeding children for growth and adults for their daily work.

Scores of books have been written by chemists, biologists, dietitians, doctors and experts in nutrition in which endless chapters have devoted thousands of pages to telling the story of food, its source, preparation and use. But much of the value of all the discussions is lost because no way has yet been devised for sifting facts from foolishness. Far more writers have tried to steer the nutritional habits of man without any intelligent knowledge of what they were talking about than have recognized authorities in the field.

For every McCollum, Sherman, or Rose, a dozen self-appointed publicists have turned to the profitable business of exploiting public health in terms of how to live on raw food, on meatless diets, on branny and indigestible breads, on the amazing regimes which having proven interesting or helpful to a few devotees are forthwith urged as the only true way to dietetic happiness.

### *Food Faddists Write Weird Books*

And these books of delusions and fads have large sales. Men who go to recognized authorities when they need help in selecting a proper ration for a dairy cow follow the nutritional notions of writers who cannot distinguish between mineral salts and vitamins and buy pretty packages of simple salt mixtures with which to correct the inadequacies of their own diet. Women who find their bathroom scales tipping at higher readings as the years slow down metabolic processes turn to the columns of the beauty specialists for advice on the choice of foods.

Is there any balm in Gilead for these deluded seekers for girlish lines and youthful figures? Is sound advice on the use of food in the human family impossible to secure?

What methods can be developed which will make it relatively as easy to choose food for a child in the nursery as for a lamb in a sheepfold? And why is it not just as possible to feed a man for maximum efficiency as it is a race horse? It should be. Theoretically it is. But human animals are not amenable to mass feeding when they have a chance to forage for themselves. And in the infinite variety of social conditions, home and business life, foods and methods of serving, as well as in the varying ages of those who gather around the table a mass of circumstances arises to make feeding human beings with a full appreciation of the needs of every individual a very difficult thing to do.

### *Milk Industry Does Splendid Work*

Progress has been made, however, and the greatly increased use of milk which has come about through the splendid educational work of the National Dairy Council is giving millions of children a chance for vigorous growth and abundant health which was denied the children of a generation ago. The true character of the vitamins is still one of the mysteries of chemistry but the importance of these elusive activators of life processes is already so well appreciated that fruits and vegetables are more generally used than ever before and the basic foods which always will supply the energy essentials are now prepared in combinations which balance and supplement each other. It has even been suggested that the next step in regulating the character of the food supply will require foods to be labelled with their nutritional values just as packages are now required to declare the net weight of the contents and the name of the maker. There are many reasons why such a requirement would be helpful. With the development of our knowledge of the vitamins has come an appreciation of the fact that foods which are apparently chemically identical have in truth very different nutritional values. Butter made in June is rich in the growth promoting vitamins. Butter churned in January is just rich in butter fat but far less potent in fat soluble A. Bread make with the old flour and water formulas looks very like the modern loaf which is rich in the lime, phosphates, proteins and vitamins of milk. But bread rich in milk solids is almost a complete food while the bread made with lean formulas is quite inadequate in its calcium and protein essentials.

### *Make Labels Informative*

If butter were labelled, "made in June" or "made in the winter months", and if bread declared on the label "this bread contains in one pound 1,300 calories of energy producing food of which 200 calories are furnished by milk" the consumer would be able to choose his bread and butter with some assurance that he was getting an adequate ration.

But too great responsibilities cannot be placed on labels. Even when they tell the truth they usually speak softly. Sometimes they are read. More often they are mere decorations on the package.

There is, however, another way by which the importance of good food may be brought home to every family. That way is via the family doctor, the family dentist, and the teacher in the school. But one difficulty stands in the road. That is the difficulty of providing these three servants of the family with sound nutritional information. The medical profession, and the dental profession as well, has never specialized in the field of nutrition. The chemistry of food, digestion and assimilation is a very modern science. The teachings of even a few years ago are inadequate today. And unless in the midst of a busy professional life our doctors and dentists can find time to give serious thought to every new development in physiological and biological chemistry they cannot keep step with the newer knowledge of nutrition which the experts in that field are enriching month by month with the contributions from their laboratories. And it is even more difficult for our teachers to keep abreast of the times.

There are ways, however, by which this necessary education of busy professional men may be furnished them. Every progressive doctor, dentist or teacher looks forward to monthly and annual meetings with his fellow workers. He attends these meetings whenever he can and he follows their proceedings in his technical journals. A typical opportunity to tell the story of modern nutrition to such a group has just been utilized by our department of Nutritional Education.

### *A Successful Educational Method*

When the Chicago Dental Society held its annual meeting and clinic at the Drake

Hotel, January 27 to 29, an effort was made to bring to the more than five thousand dentists who attended the meetings some of the modern ideas of food in its role as the builder of better teeth and the creator of better health.

Through the courtesy of the Chicago Medical Society and the fine co-operation of Miss Carol Kellar, Lay Secretary of the Illinois Medical Society, the National Dairy Council, the Institute of American Meat Packers and the American Institute of Baking brought together, perhaps for the first time in the modern movement for better knowledge of foods, an exhibit of milk, meat and bread which presented these three basic foods in a new and clearer light as the body and health builders.

The exhibits were prepared in such a way that they supplemented each other and brought to the table with them the necessary fruits and vegetables to complete the list of food essentials without which no amount of proteins, fats or carbohydrates can supply the needs of the growing child.

The exhibit with its charts and carefully arranged meals did much to break down the too common notion held by many dentists that sound teeth cannot be built except when the food supply is filled with coarse lime carrying foods.

### *Modern Breads Build Sound Teeth*

The exhibit of the Institute was arranged by Miss Rich of the department of Nutritional Education who was constantly at the booth to explain the role of food in building bone and tooth structure and to revise the ideas of nutrition of many dentists who wished to add to the facts they obtained when they were students something of the latest work in nutrition laboratories.

As a result of this first co-operative exhibit, Miss Rich has arranged to prepare similar exhibits for several state dental societies and for school departments which are looking for up-to-date information for their teachers and students.

This exhibit meant far more to the work of the Institute than the mere meeting of interested people and the booking of other engagements. It proved the practibility of the plans of the department of Nutritional Education to spread the facts about bakers products throughout the professional world which comes in contact at the sick bed and operating chair with those who have a real concern in proper feeding and correct diets.

And more important even than that was the success of the effort of the Illinois and Chicago Medical Societies to bring the food industries into their proper place in the public health movement.

### *The Baking Industry Must Help*

In many ways this great dental clinic was a human experiment station in which the developing projects which have so great an influence on the health of the community were studied and appraised. There is no end to the opportunity for carrying such work to the people through their family doctors, the dentists who care for the teeth of their children, and the teachers who day after day supervise the lives and conduct and education of a fourth of our population.

The only difficulty will come with the need for enlisting every baker in the movement. The work to be done is too vast, too important, too necessary to be turned over to a single agency to carry on. American Institute of Baking is well equipped as a fact-finding experiment station but it needs many helpers to carry its facts to the public. And that is where every baker can enlist for service in a war on ignorance of the real value of his products in building a finer human race.

## *Using Bread to Build Sales*

"THERE is probably no one thing!" says Ruth Haynes Carpenter in Food Service, "that will lift an otherwise plain and uninteresting meal out of its monotony, as variety in bread."

It is not uncommon for an eating place to gain a reputation on certain soups, meats or desserts which it prepares to perfection. It is much more unusual that it become known for good breads. And yet, there is no one kind of food used so often, appearing meal after meal, as bread. Its true gastronomic position and importance in its effect on the satisfaction we obtain from our foods is seldom considered. Even those in the food profession usuall relegate breads to the background in their plans for making menus attractive. They usually look upon them as a necessity but uninteresting.

We need education so that breads will be as interesting to us as desserts. Epicures will spend much more time in choosing precisely the right sauce for a meat, or just the correct dessert, without paying any more attention to the breads to be served than they do to the laying of the napkin. The same bread is not suited to accompany different foods any more than is the same condiment. Too few caterers and restaurant managers take this into account in planning their menus. Here is a place where their science and art can be used to the greatest advantage, in bringing back patrons who enjoy the result of careful thought in food preparation.

Many restaurants and cafe managers have found real profit in stressing this particular appeal to the public. A famous old hostelry in New York, dispensing hospitality in the days of Washington and Lafayette, and patronized by the early aristocracy of Washington Square, still draws business from the uptown places because of its wonderful foods. Especially does it maintain the old custom of serving at each place before other food is brought, one of their crusty French rolls, according to the custom.

A popular priced restaurant further uptown built up a huge business largely on the strength of its reputation for serving delicious breads without cost to the patrons. On each table a basket of little rolls, of varied assortment could be munched until the order arrived. This attracted many of epicurean taste as well as those who delighted in getting something for nothing. Authors, painters, and others seeking the unusual were drawn to the tables with the little rolls. Each one of them made only a few bites but some were crisp, some were soft, with a bit of sweet on top, others with poppy seed, and all of them in the most engaging shapes and sizes.

Who, visiting Chicago, has been unfortunate enough to miss the treat of breakfasting at the old French and German restaurant down in the Loop just a few blocks off the boulevard. Here you can get the most complete array of variety in rolls and fancy yeast breads I have ever seen. German coffee cake, Caraway bread, Dutch apple cake, Moravian bread nd Zwieback to represent German baking; French coffee rolls, Brioches, French bread, Danish pastry and others which you ordinarily see only on the Continent. The breads have become so well known that a subsidiary business has grown up of selling all that they can possibly make to people who come from near and far to buy these interesting foods to take home.

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I am requisitioning your Baking Technology to keep ourselves always cognizant of the work being done by your Institute in the general realm of nutrition as well as the special field of baking.

E. N. Hutchinson, M. D. C.,
Western Agency, Inc.,
Seattle, Wash.

# BAKING TECHNOLOGY

**A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.**

H. E. BARNARD, Editor

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FEBRUARY 15, 1926

### *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

## *The Big Baker*

WHAT is the meaning of the expression—"The Big Baker?" Does it mean a baker big in stature, in volume of business? Big in capital—big in what?

And who is the small baker? Is he the one with the smallest shop? By what measuring stick are bakers to be measured?

The small baker is like all small men. He regards baking strictly as a money-making proposition. He is out to get the money. He is jealous of competition. He fears his neighbor. He has so little confidence in himself and his product that he cuts prices, avoids bakers' associations, and, however active his mind, he lacks judgment and runs around in a business circle.

Who then is the "Big Baker?" I know bakers who started with one oven and a push-cart, who own large and well-equipped bakeries today; but they were not small bakers in the beginning even though they started in a small way, they were even then "big bakers."

How shall we describe a big baker? The big baker is one who recognizes his responsibility to the public and tries to fulfill it. He knows that wheat forms the basis of the food of this nation and he strives always to prepare and present his bakery products in a form that makes them wholesome, health-giving foods, with a pleasing appearance that lends an appetite appeal. He is proud of the industry of which he is a part. He believes in bakers' associations. He wants his own business to grow and he wants the industry to grow. That's the real "Big Baker." Do you agree with me?

Sincerely Yours,

L. J. Schumaker,
President, American Bakers Assn.

## *The Bread of Van Loon*

IT takes all kinds of authors to meet our literary tastes and all kinds of breads to satisfy the demands of strangely trained palates.

Usually our novelists confine their efforts to grinding out love tales, our poets stay with their metres and our historians keep busy recording the history other men make. And in the same way our shoemakers do their best to make shoes people want, our architects build homes that young couples can buy on the installment plan, and our bakers turn out the loaves that their hungry customers like.

Into the midst of a well ordered world of literary effort and successful baking the American Mercury for January tumbled Hendrik Wilhelm Van Loon with a weird tale of bread. But it was no more a bread story than it was history for not even a Van Loon with a literary reputation reaching back to the origin of man and thence

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leaping centuries at a time to these days of sanitation and vitamins can write of matters which are as far beyond his ken as the milky way is beyond the barnyard of an Illinois dairyman. No, Van Loon wasn't writing of modern bread at all. He was dreaming of by-gone days, days before sanitation had cleaned out the unwholesome conditions which produced the strange flavors he loves to recall, days when his appetite was stimulated by the "awful gloom of a Moscovite prairie" to the point when any sort of bread tasted like manna from heaven.

Nor has Mr. Van Loon brought his historical researches up to date in the matter of modern production methods. If he had he would never, in these days when efficiency and mass production are working together to pay off war debts and furnish plumbers Packards, dare suggest that every people should make its own emblematical loaves, that craft workmanship should replace machines in the shop, and that the really nutritious bread from the modern bakery should give place to the coarse, hard, dark, sour, indigestible, non-nutritious breads which our immigrant population made before it learned better.

Really, Mr. Van Loon's notions of the sort of bread he would eat if he could get it suggest a perverted appetite which would find solace in a daily diet of smoked herring or turnip greens.

And his reflections on the horrors of sanitation make us wonder if his inhibitions extend as well to bath-tubs and fresh linens.

But after all it doesn't matter very much what the individual taste, even of an historian, demands in the matter of bread. For just as long as the baker can bring together good flour, virile yeast, rich milks and sugars and fats, combine them with the use of specialized machinery and deliver them fresh and clean and fragrant, our mothers will thank their stars that baking day has gone forever. And as for the lonely Van Loon's who do not know a good thing when they see it, perhaps it is a blessing that they can turn back the hands of time and join the skin-clad crowd eating roots and raw meat before the cavern door.

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## Wolves in Sheep's Clothing

MANUFACTURERS of specialties are forever trying to induce the bakers to give free as premiums their products, and with the advent of a new year they seemingly take on more impetus.

Right now these fellows are spreading their beguiling literature to members of the baking industry, and as some of it is reaching the desk of the Chairman of the Industrial Relations Committee, he thinks it propitious to send out this timely warning to

*Beware of Wolves in Sheep's Clothing!*

Premium and special trade inducements never did and never will pay, and they are the principal cause of most of the discontent and unhappy trade relations among bakers, and are a menace to the industry.

Whenever a manufacturer has a new product to put on the market, *particularly one that repeats quickly*, the question usually arises as to the advisability of using a premium of some sort as an "extra" inducement to overcome dealer and consumer antipathy, and—

That's where the glib-tongued premium orator comes in, because no product has a quicker turnover than bread, and gullible bakers swallow hook, bait, sinker and even the "line of bull" from these premium pests.

If you are using premiums, cut them out—in the name of fair play and a credit to the industry of which you are a part.

Co-operatively yours,
AMERICAN BAKERS ASSOCIATION,
L. A. SCHILLINGER,
*Chairman, Industrial Relations Committee.*

# Lubricating Oils

## *How to Test and Buy Them*

By W. C. Luckow

THE selection of satisfactory lubricating oils for various purposes is a problem of much technical and economic importance in bakery operation. The value of an oil for lubrication is generally determined by the nature and characteristics of the oil in relation to the particular purpose for which it is to be used, and a laboratory examination of the oil is of considerable help to the engineer.

The Analytical Laboratory of the Institute has made many examinations and tests of samples of lubricating oils sent in by members requiring this information, and the following discussion of the tests made and the results obtained should have special interest for bakery engineers, purchasing agents and others.

The examination of a lubricating oil in our laboratory includes these tests:

Specific gravity, and Beaumé degree
Viscosity at 100 degrees Fahrenheit
Viscosity at 150 degrees Fahrenheit
Viscosity at 212 degrees Fahrenheit
Flash point
Fire point
Saponifiable matter
Mineral acids
Cold test

In addition to these tests, the Conradson carbon residue is determined when required.

**Specific Gravity.** The specific gravity of an oil is the ratio of the weight of a definite volume of the oil to the weight of the same volume of water at the same temperature. For instance, if a certain volume of oil weighs 0.900 pound, and the same volume of water weighs 1.000 pound, then the specific gravity of the oil is 0.900.

**Beaumé Degree.** There is a definite relation between specific gravity and Beaume so that if the specific gravity of the oil is known, the Beaumé° may be calculated by means of a formula, or obtained from tables. It is of interest to note that for liquids lighter than water the lower the specific gravity the higher the Beaumé°. For instance, a specific gravity of 1.0000 corresponds to a Beaumé of 10.0°, a specific gravity of 0.8000 to a Beaumé of 45.0°, etc. The specific gravity and Beaumé° are of rather limited importance when judging the lubricating value of an oil.

**Viscosity.** Perhaps the most important test is that of viscosity. The determination is very useful in classifying oils and in judging their suitability for the purpose for which they are to be used. When a liquid is such that it pours slowly like a thick syrup it is said to be very viscous, that is, it has a high viscosity. When it pours like water it is not considered very viscous, and it is said to have a low viscosity. The apparatus used for the determination of viscosity consists essentially of a vertical cylindrical tube of standard height and diameter at the bottom of which is a small orifice of definite size. The tube is surrounded by an oil bath for heating the oil under test to the proper temperature. The cylindrical tube is filled with the oil to be tested and when the oil reaches the proper temperature it is allowed to flow through the standard orifice. The time in seconds required for 60 cubic centimeters of the oil to flow through the orifice at a given temperature is recorded as the viscosity of the oil at that temperature.

The various oil manufacturers have different standards for classifying their oils, as light, medium, heavy, etc. The heavy oil of one manufacturer may correspond to the medium oil of another, etc.

The United States Government Specifications* for the lubrication of internal combustion engines, except aircraft, and Diesel engines are given in Table I.

TABLE I.

| Grade | Viscosity at 100° F. in Seconds | Viscosity at 210° F. in Seconds | Flash Point ° F. Minimum Limit | Fire Point ° F. Minimum Limit | Pour Point ° F. Maximum Limit | Carbon Residue Per Cent Maximum Limit |
|---|---|---|---|---|---|---|
| Extra light | 135–165 | | 315 | 355 | 35 | 0.10 |
| Light | 180–220 | | 325 | 365 | 35 | 0.20 |
| Medium | 270–330 | | 335 | 380 | 40 | 0.45 |
| Heavy | 360–440 | | 345 | 390 | 45 | 0.55 |
| Extra heavy | 450–550 | | 355 | 400 | 50 | 0.70 |
| Ultra heavy | | 55– 65 | 360 | 410 | 50 | 0.80 |
| Tractor | | 75– 85 | 380 | 430 | 50 | 1.50 |
| Tractor heavy | | 90–100 | 390 | 440 | 50 | 1.75 |
| Motorcycle | | 110–120 | 400 | 450 | 50 | 2.00 |

Specifications for color, acidity and corrosion are also stated.

Mistakes are often made in selection of oils without attention to their viscosity. Imagine the effect of using an oil as viscous as thick molasses for lubricating a sewing machine, or using an oil as thin as water for lubricating a large heavy bearing. Both would be useless, and yet to a lesser degree that is what often occurs. The losses due to improper lubrication include the loss of power and also such losses as the wear of machinery, the expense of shutdowns, etc. The power absorbed in overcoming friction varies with the type of plant and the character of the machinery but for properly lubricated plants operating under normal conditions it is seldom less han 5 per cent and often greater than 30 per cent of the total power developed.** This loss would be increased by improper lubrication. The most satisfactory oil to use is an oil that will have as low a viscosity at stationary and running bearing temperatures as will maintain the lubricating film. With low pressure and high speed a very mobile oil should be used and with higher pressure more viscous oils should be used.

Machinery manufacturers usually determine by actual test the proper oil to use in their machines and it is usually wise to follow their recommendations. Automobile manufacturers usually recommend a certain type of oil for use in their cars. They often recommend the use of a less viscous oil in cold weather than in warm weather.

**Flash Point.** The flash point is obtained by heating the oil in an open cup and noting the temperature at which the oil vapor will flash when a small flame is passed through it.

**Fire Point.** After reaching the flash point the heating of the oil is continued until the temperature is reached at which the oil catches fire when a small flame is passed through the vapor. This temperature is recorded as the fire point. The flash and fire points are of importance in regard to the fire risk of the oil and they should therefore be sufficiently high to insure safety.

**Saponifiable Matter.** Saponifiable matter in lubricating oils usually consists of vegetable or animal oils, fish oils, etc. Saponifiable matter is sometimes added to oils to give them certain desired characteristics. We have found saponifiable matter in only a few of the oils examined. It is sometimes added to oils for Ford motor cars. It is detected by adding caustic potash to the sample and determining whether any soap has been formed.

**Mineral Acid.** Mineral acid is determined by titration with standard alkali using a suitable indicator such as phenolphthalein. Mineral acid should be absent, or, if present, should occur in such small amount that it will not cause injury to the metal parts. Mineral acid may find its way into the oil if the refining processes are not properly carried out.

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* Bureau of Mines Technical paper 323A.

** Gebhardt Steam Power Plant Engineering, 3rd ed., p. 669.

**Cold Test.** The cold test is determined by chilling the oil under certain specified conditions and observing the lowest temperature at which it will flow. Below this temperature the oil is of about the consistency of butter and it is evident that for the operation of a machine at a low temperature an oil must be chosen such that its cold point is below the lowest operating temperature of the machine. This effect is especially noticeable in starting an automobile in cold weather when it is found that the oil is so thick that the starter will hardly turn the engine over. The cold test is of considerable value in judging the value of an oil for certain purposes.

**Conradson Carbon Residue.** This test is conducted by heating a weighed sample of the oil in an apparatus of special construction, in the practical absence of air. This procedure gives an approximate measure of the "carbon forming" properties of the oil and the test is of considerable value. If the oil is to be used for the lubrication of internal combustion engines, such as automobiles, the carbon residue should be low.

**Practical Tests.** Certain machines, such as the Thurston oil testing machine and other machines have been constructed to determine in a practical way how oils behave in actual use. A bearing is lubricated by the oil under test and rise in temperature of the bearing, friction under various loads and other data are obtained. These tests are of considerable value but are not without criticism.

Tests are often made somewhat as follows: The crank case of an automobile is filled with the oil to be tested and the automobile is run for 500 miles without addition or change of oil. Viscosity tests are then made on the original oil and on the oil after use, and from this data very valuable information is obtained.

These practical tests are often of much value but they require a large amount of time and are expensive to carry out. The routine laboratory tests can be performed in a short time.

**Results of Laboratory Examinations of Samples of Oil.** Table II gives the analyses of a large number of lubricating oils tested by the Technical and Service Department.

### *Discussion*

Most of the oils received by the Technical and Service Department were for automobile use and since most automobiles use oils of medium viscosity it is evident that some of the oils received were entirely unsuitable for the purpose. In a few cases the oils were not viscous enough to protect the machine and in many cases they were too viscous, thereby causing an unnecessary loss of power troubles.

The problem of lubrication is a very important one and warrants considerable attention. It should be remembered that the oil and the purpose for which it is employed go hand in hand and it is always necessary to consider the purpose for which the oil is to be used when passing judgment on an oil. An oil may be excellent for one purpose and entirely unsuitable for another. If several oils are under consideration, one of them may be more suitable for the purpose than any of the others.

Improper lubrication results if the oil is too thick and means a loss of power with consequent loss of money. If the oil is too thin the lubricating film will break down, the bearings will be "burned out", parts of the machine will have to be replaced and time will be lost. The selection of a lubricant is thus of much consequence and a proper oil means money saved and satisfactory results.

TABLE II.

| Number | Mark | Specific Gravity | Beaume | Viscosity @ 100° F. | Viscosity @ 150° F. | Viscosity @ 212° F. | Flash ° F. | Fire ° F. | Saponifiable Matter | Mineral Acid | Cold Test ° F. | Conradson Carbon Residue |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 298 | Automobile | 0.9286 | 20.8 | 693 | 485 |  | 368 | 421 | None | None | 7.7 |  |
| 299 | Automobile | 0.9151 | 23.0 | 533 | 151 | 63 | 436 | 478 | None | None | 33.8 |  |
| 321 | Truck | 0.8778 | 29.5 | 385 | 140 | 61 | 436 | 474 | None | None | 25.7 |  |
| 515 |  | 0.8980 | 25.9 | 213 | 85 | 52 | 397 | 427 | None | None | 26.6 |  |
| 973 |  | 0.8755 | 29.9 | 337 | 107 | 60 | 422 | 486 | None | None | 35.6 |  |
| 974 |  | 0.9299 | 20.6 | 615 | 142 | 83 | 373 | 420 | None | None | 24.8 |  |
| 975 |  | 0.8732 | 30.3 | 313 | 106 | 57 | 378 | 425 | None | None | 32.0 |  |
| 976 |  | 0.8931 | 26.8 | 399 | 125 | 77 | 381 | 447 | None | None | 33.8 |  |
| 977 |  | 0.9050 | 24.7 | 485 | 140 | 75 | 408 | 466 | None | None | 37.4 |  |
| 978 |  | 0.9062 | 24.5 | 471 | 125 | 58 | 399 | 462 | None | None | 33.8 |  |
| 1686 | Motor | 0.9003 | 25.5 | 410 |  |  | 416 | 447 | None | None | 30.2 |  |
| 1789 |  | 0.9335 | 20.0 | 329 |  | 48 | 345 | 371 | None | None | 6.8 |  |
| 1790 |  | 0.8828 | 28.6 | 311 |  | 54 | 441 | 475 | None | None | 14.9 |  |
| 1791 |  | 0.9061 | 24.5 | 237 |  | 46 | 397 | 429 | None | None | 23.0 |  |
| 1792 |  | 0.9033 | 25.0 | 338 |  | 53 | 414 | 441 | None | None | 22.1 |  |
| 1793 |  | 0.8971 | 26.1 | 208 |  | 47 | 400 | 423 | None | None | 22.1 |  |
| 1794 |  | 0.8781 | 29.4 | 331 |  | 60 | 432 | 469 | None | None | 24.8 |  |
| 1832 |  | 0.8977 | 25.9 | 221 |  | 49 | 371 | 401 | None | None | 22.1 |  |
| 1833 |  | 0.8968 | 26.1 | 263 |  | 50 | 390 | 416 | None | None | 21.2 |  |
| 1857 |  | 0.9135 | 23.2 | 204 |  | 45 | 337 | 357 | None | None | 20.3 |  |
| 1858 |  | 0.9090 | 24.0 | 180 |  | 45 | 353 | 389 | None | None | 10.4 |  |
| 5107 |  | 0.9092 | 24.0 | 577 | 147 | 60 | 463 | 501 | None | None | 21.2 |  |
| 5108 |  | 0.9268 | 21.1 | 663 | 155 | 58 | 387 | 416 | None | None | 5.0 |  |
| 5109 |  | 0.9302 | 20.5 | 587 | 143 | 57 | 373 | 407 | None | None | 10.4 |  |
| 5431 | Automobile | 0.9321 | 20.2 | 630 | 150 | 55 | 368 | 413 | None | None | 8.6 |  |
| 5432 | Automobile | 0.8980 | 25.9 | 470 | 146 | 63 | 414 | 448 | None | None | 44.6 |  |
| 5433 | Auto heavy | 0.9154 | 22.9 | 570 | 172 | 64 | 400 | 438 | None | None | 32.0 |  |
| 5807 |  | 0.8824 | 28.7 | 552 | 159 | 65 | 435 | 496 | None | None | 35.6 |  |
| 5808 |  | 0.9363 | 19.5 | 451 | 115 | 50 | 295 | 395 | None | None | 17.6 |  |
| 5809 |  | 0.9339 | 19.9 | 361 | 101 | 47 | 337 | 392 | None | None | 10.4 |  |
| 5810 |  | 0.9363 | 19.5 | 364 | 100 | 47 | 353 | 400 | None | None | 14.0 |  |
| 6085 | Auto | 0.8820 | 28.7 | 325 | 113 | 56 | 390 | 445 | None | None | 29.3 |  |
| 6086 | Auto | 0.8860 | 28.0 | 714 | 166 | 75 | 410 | 463 | None | None | 33.8 |  |
| 6087 | Auto | 0.8876 | 27.7 | 1279 | 241 | 92 | 426 | 480 | None | None | 33.8 |  |
| 6088 |  | 0.8758 | 29.9 | 320 | 113 | 59 | 408 | 453 | None | None | 24.8 |  |
| 6089 |  | 0.8860 | 28.0 | 767 | 207 | 81 | 420 | 485 | None | None | 31.1 |  |
| 6090 |  | 0.8885 | 27.6 | 2033 | 333 | 125 | 481 | 544 | None | None | 32.9 |  |
| 6091 |  | 0.9383 | 19.2 | 589 | 133 | 62 | 347 | 398 | None | None | 25.7 |  |
| 6092 |  | 0.9394 | 19.0 | 581 | 145 | 61 | 343 | 395 | None | None | 23.0 |  |
| 6093 |  | 0.9442 | 18.3 | 1636 | 217 | 79 | 394 | 448 | None | None | 35.6 |  |
| 6094 |  | 0.8843 | 28.3 | 700 | 223 | 84 | 410 | 471 | None | None | 34.7 |  |
| 6301 |  | 0.8772 | 29.6 | 349 | 101 | 59 | 410 | 476 | None | None | 23.0 |  |
| 6302 |  | 0.8832 | 28.5 | 669 | 206 | 80 | 400 | 476 | None | None | 34.7 |  |
| 6303 |  | 0.8756 | 29.9 | 400 | 124 | 61 | 410 | 476 | None | None | 36.5 |  |
| 6372 | Light motor | 0.9281 | 20.9 | 237 | 71 | 41 | 310 | 361 | None | None | 5.0 |  |
| 7400 | Light zero | 0.9096 | 23.9 | 211 | 79 | 44 | 336 | 395 | None | None | 9.5 | 0.11 |
| 7401 | For Fords | 0.8969 | 26.1 | 310 | 106 | 53 | 410 | 453 | Present | None | 16.7 | 0.48 |
| 7402 | Medium | 0.8959 | 26.3 | 302 | 106 | 51 | 395 | 463 | None | None | 18.5 | 0.41 |
| 7403 | Heavy | 0.8957 | 26.3 | 328 | 131 | 58 | 416 | 471 | None | None | 19.4 | 0.47 |
| 7404 | Special heavy | 0.8954 | 26.4 | 573 | 157 | 73 | 431 | 481 | None | None | 21.2 | 0.67 |
| 7405 | Extra heavy | 0.8972 | 26.0 | 1377 | 355 | 120 | 481 | 550 | None | None | 31.1 | 1.19 |
| 7939 |  | 0.8989 | 25.8 | 310 | 100 | 51 | 416 | 453 | Present | None | 19.4 |  |
| 7940 |  | 0.8754 | 29.9 | 252 | 96 | 53 | 426 | 463 | Present | None | 15.8 |  |

# Research in the Meat Industry*

## *The Research Program of the Institute of American Meat Packers*

By C. Robert Moulton, Ph. D.
*Director Department of Nutrition Institute of American Meat Packers*

**The development of the food industries must follow two lines, research and education within the industry and a fuller appreciation of the character of its service by the consumer.**

**Developments in the packing industry are equally interesting to the baker. While manufacturing materials and methods may differ, both work for the better nutrition of the consumer.**

SERVICE, economy and efficiency express in three words the chief aims of the research activities of the Institute of American Meat Packers. Another way of stating its aims is the following: The Institute of American Meat Packers through its research plans purposes to aid the industry to achieve more efficient and economic production, to insure better distribution, to effect a better utilization of product, to improve the product, to increase the knowledge and skill of those who will guide the industry, and to put all its activities, insofar as is possible, on a basis of fact.

The methods in use by the Institute are various. Such considerations as adaptability to the work, the availability of certain research agencies, and even the limitations of funds have been some of the deciding factors in the selection of methods.

Results and achievements are still in the making. They are of such a quantity and quality, however, as to confirm the industry in its purpose and to assure further work.

Both methods and results can best be shown by a presentation of the lines of work actually being carried on. This presentation will include some of the results at least insofar as they interest the worker in social and economic sciences.

### *Business Research*

In the field of business research the meat packing industry is interested in ways of eliminating wastes in the handling of live stock, in the processes of preparation of the products and in the disposal of waste material. Investigations in these fields are leading to specific recommendations for the prevention of losses and the elimination of waste.

Another of the Institute's activities is the consulting service which it offers its members, thus assisting them in any of their operating or construction difficulties. This work is carried on by the Department of Packinghouse Practice and Research. Inquiries are sent in by the members to the department, which is assisted in its replies by a committee selected from outstanding operating men in the industry. It is readily seen that any member has the benefit of an exceptional service in this respect.

This department also carries on practical experiments covering any new ideas presented to the Institute. These experiments are conducted by the members of the Institute in their own plants as a volunteer service on their part for the benefit of the membership as a whole. In this way, the industry can protect itself against exploitation by persons having worthless ideas for sale. The membership has come to realize that, if the Institute places its stamp of approval upon any process or machine, it is well worth their consideration.

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* An address before the Section of Social and Economic Science of American Association for the Advancement of Science.

### *Causes of Economic Loss*

A fertile cause of economic loss in such an industry as ours lies in the multiplicity of appliances, containers, and apparatus used by different plants, or even in the same plant, for similar or identical purposes. A survey of these appliances followed by a selection of a few types and a test of the selected models results in the acceptance of fewer forms and the realization of a great saving. One million dollars will have been saved in the next ten years through the first steps in the program of standardization of equipment and supplies.

Lard cans, lard crates and export boxes, hand trucks, beef and pork trolleys, and sausage and lard cartons are the items on which standard specifications already have been developed. Many of the standards already have been adopted by packers generally, and approval of the others is practically assured. Additional work will start soon, which should greatly increase the amount of savings.

In the work accomplished so far, the number of sizes and styles has been reduced from 806 to 26. In the case of the trolleys, one improved standard design was specified from 167 which manufacturers were keeping in stock. This makes possible not only a saving for the packer, which in turn will be passed on to the producer of live stock and the consumer of meat in the form of higher prices for meat animals and lower prices for meat, but for the manufacturer as well, since his production and inventory costs are thereby lowered.

### *Retailing Costs and Consumer Demand*

In 1922 it was apparent that there was need of comparable data on retail meat distribution, costs, expenses and profits. The value of this data is rather apparent. It serves as a norm with which any retailer can compare his costs. Thus, he will be enabled to judge concerning the efficiency of his business and to find that part of it which needs reforming. The Institute of American Meat Packers recognized this need and appropriated a large sum to make this study. The cooperation of the United Master Butchers Association, the National Association of Meat Councils, the United States Department of Agriculture, and Northwestern University, Evanston, was secured in obtaining the facts for this study. Most of the data for this report were obtained in New York City, Cleveland, and Chicago, although 100 firms in other cities contributed. The material was collected by the Bureau of Business Research, Northwestern University, and the United States Department of Agriculture, Bureau of Agricultural Economics. The chief contributions of this report are: first, the determination of the average expenses, profits, and losses in retailing meat, and the amount of and reasons for variations from such averages; second, the establishment of reasonable norms of efficient distribution with which individual dealers may compare their own details of operations; and third, summarization with respect to each phase of the trade of the conditions which contribute to success and to failure.

The Department of Agriculture followed the above report with one made by its own staff of business specialists. This report was called "Influences of Methods and Cost of Retailing and Consumers' Habits Upon the Market for Meat." This was supervised by Mr. Walter C. Davis of the Department of Agriculture. The data for this report were obtained from 1,404 stores and twenty cities, and included every type of store selling meats. One of the outstanding features developed in this study was that retail meat dealers themselves were to blame for lack of confidence on the part of consumers. The report stated that few had honestly tried to advise their customers as to what constitutes quality in meat. Many dealers, the report stated, tried to convince consumers that nothing but the best was sold over their counters, whereas in reality they were handling only lower grades of meat.

### *Government Co-operation Helpful*

The need of an adequate study of retail costs and methods was drawn by the Institute to the attention of the National Live Stock and Meat Board and by it was placed before the United States Department of Agriculture. The Department obtained an appropriation of $25,000 to continue the study among the retailers. This was successful and for two successive years the sum of $25,000 has been appropriated for this work. Department Bulletin No. 1,317 entitled "Retail Marketing of Meats," by Herbert C. Marshall, specialist in Economic Research, Bureau of Agricultural Economics, was next issued. This did not go into the consumer angle of the retail distribution of meats. It was based on data gathered and compiled before the Institute made its representations to the Board.

The next and last report to date has been "Efficient and Inefficient Methods of Retailing Meat" by Roy C. Lindquist, research agent in marketing, U. S. Department of Agriculture; research assistant, Northwestern University, Bureau of Business Research. The Institute of American Meat Packers, National Live Stock and Meat Board, and seven local branches of the United Master Butchers of America co-operated in this study. This report was guided by valuable suggestions in its preparation by Professor Horace Secrist, Director of the Bureau of Business Research, Northwestern University. The consumer phases of the survey were not discussed in this report, which the Department is distributing to thousands of retailers throughout the United States. A preliminary report concerning consumer habits has been prepared by Walter C. Davis, Marketing Specialist, and Kelsey B. Gardner and Lawrence A. Adams, Associate Marketing Economists.

### *Education*

In the field of industrial and commercial education, the efforts of the packing industry may best be characterized as a **progressively successful experiment.** In this venture, undertaken as part of a development plan proposed in 1922 by Thomas E. Wilson, the Institute of American Meat Packers has entered into co-operative arrangements with the University of Chicago and with other universities adjacent to important packing centers. Columbia University, The University of Cincinnati, The University of Wisconsin, The University of Nebraska, and The University of Maryland are now actively co-operating with the Department of Industrial Education of the Institute in the development of evening courses of collegiate grade for packinghouse employees. Over seven hundred students will be enrolled in these courses during the present academic year. Plans are going forward to extend this work to a total of fifteen packing centers—in each case through the co-operation of the best universities of the country; universities which are particularly qualified to conduct business and industrial education.

In the University of Chicago, a regular 4-year Residence Course in the Business of Meat Packing has been successfully established for young men who expect to enter the industry. At the present time, a considerable number of graduates of agricultural colleges (16) are included in the 4th year of this course. The University of Chicago also conducts correspondence courses in nine different subjects pertaining directly to practical phases of the packing industry for the benefit of employees of ambition and grit who desire to get ahead in the industry by improving the value of their services to it.

In the attempt to teach the technique of certain phases of the industry, the lack of textual material and of experienced teachers is a distinct handicap. In the beginning, it has been necessary to draft instructors from the operating and executive staffs of the industry. The preparation of text books and the training of teachers have constituted the chief cause of delay in the working out of adequate educational facilities in the packing industry.

### *Nutrition*

The industry is greatly interested in the subject of nutrition for two reasons: first, because it handles and sells food products; second, because its raw material, the animal, must be properly nourished in order to be a good source of these food products.

In the field of human nutrition the industry is using the research fund and fellowship method. Both the National Live Stock and Meat Board and the Institute of American Meat Packers have placed funds in research laboratories at educational institutions either directly or through the National Research Council. A National Live Stock and Meat Board fellowship has been placed at the University of Rochester under G. H. Whipple, Dean of the School of Medicine and Dentistry. The subject being studied is ''The Use of Meat and Meat Products in Blood Regeneration.'' A second fellowship deals with the subject of ''Meat and Other High Protein Foods in Reproduction and Lactation.'' This fellowship was placed for the first year at Columbia University under Dr. H. C. Sherman. For the present year it has been placed at the University of Rochester under Dr. J. R. Murlin. A third grant of the Meat Board has been given to Dr. E. B. Forbes at the Institute of Animal Nutrition for a study of the iron content of meats. The Institute has placed a research fund at Ohio State University under Dr. R. G. Hoskins, Professor of Physiology, for a study of ''The Effect of Meat on Voluntary Activity, Vigor, and Life Span of Animals.''

In the field of animal nutrition the industry is working along two lines. The problem of soft and oily pork is one that vexes parts of the industry. The Institute is co-operating with the United States Department of Agriculture and certain southern experiment stations on this problem. It has also placed a research fellowship at Yale University under Dr. L. B. Mendel for a study of ''The Effect of Food Upon Body Fat.'' A second problem that interests the meat industry is the broad one concerning ''Factors Affecting the Quality and Palatability of Meat.'' This project was initiated by the National Live Stock and Meat Board and it soon engaged the attention of the American Society of Animal Production and the Association of Land Grant Colleges. The work is enlisting the co-operation of the industry, the United States Department of Agriculture and twenty-nine state experiment stations.

### *Scientific Research*

In the fields of general scientific research and packinghouse practice the meat packing industry is making a direct attack upon certain of its own intimate problems. For three years it has co-operated with the Tanners Council of America in a study of the methods best suited for the curing of hides. This work has involved the active co-operation of certain member companies which have allowed the Institute to use parts of their space and equipment. The Institute is also participating in co-operative research on corrosion in refrigerating machinery with the American Society of Refrigerating Engineers and four or five other agencies.

The Institute is making a direct attack on certain meat-curing problems through its own staff, through the Thomas E. Wilson Research laboratory at the University of Chicago, and through the University of Chicago itself. The subjects being attacked include the following: The use of nitrate and nitrite in pickle solutions; the role of sugars in pickle solutions; the use of various preparations in curing meats; the use of hard waters in pickle solutions; the comparative value of market varieties of salt in the curing of meat; the best methods of cleansing and sterilizing packing house rooms and equipment; the cause of ham souring; slimes on meat products; and molds on meat products. The work with sugars has been materially assisted by grants from three producers of commercial sugars and syrups. The work on ham souring has been carried on under the Arthur Lowenstein Fellowship of the Institute of American Meat Packers in the laboratories of the Department of Bacteriology at the University of Chicago. Five full time research men are at work on this complete program as well as the men in various plants who are giving some part time attention to the work.

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We have found the few copies of Baking Technology which have come into our possession of so much interest that we are wondering whether you will put our name on your mailing list as many publications have done.

**Margery Cousins, Advertising.**

## *Ice Cream and Daily Bread*

THE public will be slow to suspect the hand of monopoly, or any ulterior motive in the tendency, except that of profiting by economic-efficiency as it reaches into the food industries.

In the nature of things, it is impossible to monopolize baking, as long as flour and the other ingredients of bread, cake and pie are purchasable at every grocery. Every family kitchen is a bakery, and can compete with the product of the great corporations to its heart's content. The same is precisely true of ice cream, which can be made to suit the family palate by anyone willing to mix the makings and grind the crank. It is even possible to do the grinding from the nearest light socket, if you have one of those highly mechanical culinary establishments.

The urban home prefers its bread and ice cream ready made, the same as it buys its socks, nightgowns, chemises, shirts and collars. Scientifically prepared foods save hours of household toil, and, generally speaking, are more than likely to be of better dietetic and hygienic quality than the home article. Besides, the American people have lost their fear of monopoly, per se. They know how to regulate any business that tries to take advantage of them.

—**Phila. Evening Bulletin.**

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The United Yeast Co., Ltd., of London, England, has found Baking Technology of such interest that it has sent the publishers a check covering subscription beginning with the first issue of January, 1922. The last paragraph of their letter says: "We like your publication very much indeed, and it will be a very valuable addition to our library here."

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"Old glory, old hay, old bread,
Stand a man in good stead."

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UNIVERSITY OF ILLINOIS

# What Is the Saturation Point?

## *Some Results of Feeding Experiments with Bread as a Component of the Diet*

By C. B. Morison and R. H. Shaw

The effect of feeding bread as a component of an otherwise “complete” or “basic” diet is of considerable interest in relation to the dietary problems of bread. The average per capita bread consumption of the continental United States is probably well below that of many European countries, such as Portugal, Spain, France, the Scandinavian countries and Russia. It is generally recognized that there is inherent inaccuracy in estimates of national bread consumption, though it is probable that the average per capita daily bread consumption of all kinds of bread in this country does not reach one-half of a pound. Statements often appear in the current popular literature that a certain European nation has reached “saturation” or the “limit of safety” in the consumption of bread and that further increase will involve potential disturbances in normal nutrition.

It is therefore of some importance to attempt to obtain information on the amount of bread that may be used in a selected diet in relation to observed effects, such as growth, maintenance and reproduction.

### *Purpose of the Investigation*

The purpose of the following simple plan of feeding experiments was to note the effects of a selected diet containing various amounts of bread made from a known formula on the growth of laboratory animals.

### *Experimental*

The “complete” or “basic” diet selected was made up according to the following formula:

| | |
|---|---|
| Casein | 20% |
| Butterfat | 15% |
| Starch | 56% |
| Salt mixture | 4% |
| Dried Yeast | 5% |
| | 100% |

The butter fat was prepared by melting butter at a low temperature and the clear fat separated from the sediment by decantation and filtration. The salt mixture and dried yeast were obtained from the Harris Laboratories.

The bread was made from the following formula in the Institute Bakery and contained whole milk solids in accordance with the Federal Standard for milk bread, F. I. D. 188,—

| | | |
|---|---|---|
| Flour | 100% | (N. W. Spring patent) |
| Water | According to absorption | |
| Yeast | 1.75% | (Fleischmann) |
| Sugar | 2.00% | |
| Salt | 1.75% | |
| Powdered whole milk | 2.50% | (Merrell-Soule) |
| Shortening | 2.00% | |

The baked bread after allowing to stand over night on the rack was then sliced and the slices spread over the rack and dried at room temperature until crisp. The air dried slices were then ground in a power mill to a coarse meal.

The “basic” diet and the air dried milk bread were analyzed according to the results expressed in Table I.

TABLE I.

Analyses of Basic Diet and Milk Bread.

| | Basic Diet % | Air Dried Milk Bread % |
|---|---|---|
| Water | 7.47 | 8.09 |
| Protein | 18.49 (N x 6.38) | 14.18 (N x 6.25) |
| Nitrogen free extract | 54.31 | 70.11 |
| Crude fiber | 0.68 | 1.39 |
| Fat | 15.32 | 4.46 |
| Ash | 3.73 | 1.77 |
| | 100.00 | 100.00 |

The calorie equivalents of the basic diet and the dried milk bread respectively, were calculated from the analyses stated in Table I.

Experimental diets were prepared from mixtures of the basic diet and the dried ground milk bread containing (1) 75% of the total calories as basic diet and 25% as dried milk bread, (2) 50% of the calories as basic diet, and 50% as dried milk bread, (3) 25% of the calories as basic diet and 75% as milk bread.

The experimental animals selected for the feeding tests were young and growing white rats of known antecedents from the animal colony of the nutrition laboratory. They were confined in individual cages of the screen and pan type provided with food and water cups. Their only source of food was the experimental diets and a constant supply of clean and fresh drinking water.

As it was considered of interest to observe the total food intake of the animals during the feeding period, a practical procedure was devised for this purpose which while not entirely free from objections gave results which approximate the total food consumed.

The diets were placed in small friction top cans, designated with a distinctive mark on the side of the can and cover. The total weight of can and contents was then noted. The diet from the weighed can was then transferred to the feeding cup with a small spoon, placing a sheet of smooth paper beneath the cup so that any accidentally spilled diet could be at once returned to the cup.

The cages were changed twice during each week, and any scattered food found on the floor of the cage was collected and returned to the can. When the contents of the can was exhausted, the can was weighed, and the difference in weight between the filled and empty can was taken as the approximate weight of the food consumed in the period of time required to exhaust the contents of the can.

Five groups of six rats each, were placed on the diets as follows:

Group 1. "Basic" diet exclusively.

Group 2. "Basic" diet 75%, dried milk bread 25% of the total calories.

Group 3. "Basic" diet 50%, dried milk bread 50% of the total calories.

Group 4. "Basic" diet 25%, dried milk bread, 75% of the total calories.

Group 5. Dried milk bread exclusively.

The graphs shown in Charts 1 and 2 indicate the growth curves of the animals placed on the various diets for a feeding period of seventy days. It is apparent that generally satisfactory growth is shown by the two groups of animals which received the diets containing 25% and 50% respectively of their total calories as milk bread. When 75% of the total calories of the diet consisted of milk bread there was still comparatively good growth, but the increases in weights were not as satisfactory in comparison with those of the animals fed on the diets containing 25% and 50% of their calories as milk bread. The growth curves of the group of animals fed exclusively on Government Standard milk bread are similar to those previously reported and are included for comparison.

The total food intake of each animal for the feeding period of seventy days, and the amounts of the proximate constituents of the diets obtained by calculation from the analyses of Table I are indicated in Table II:

TABLE II.

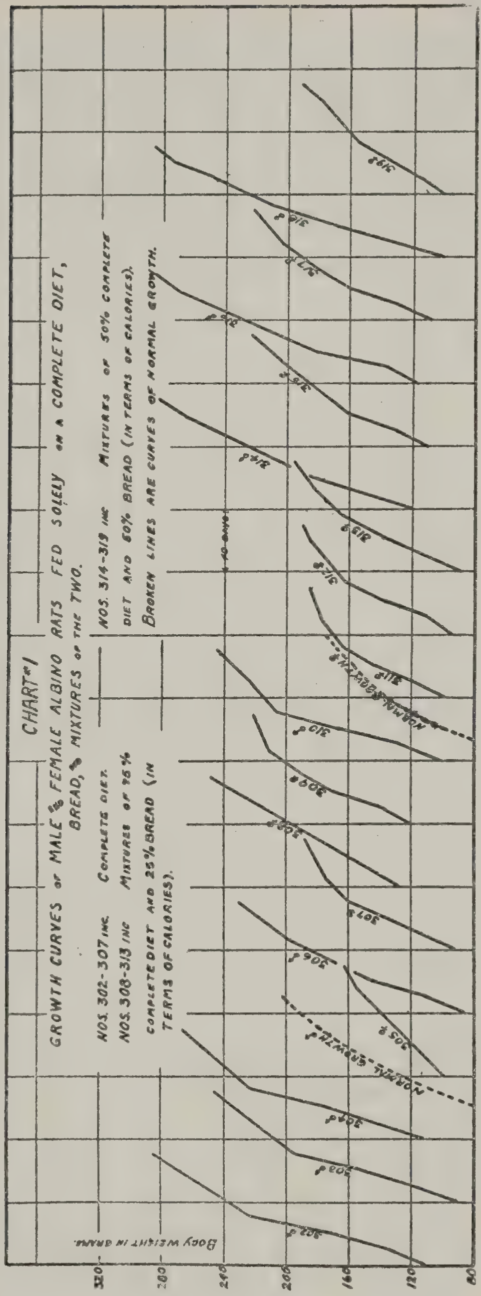
**Showing Total Food Intake and Proximate Constituents of the Diets in Grams.**

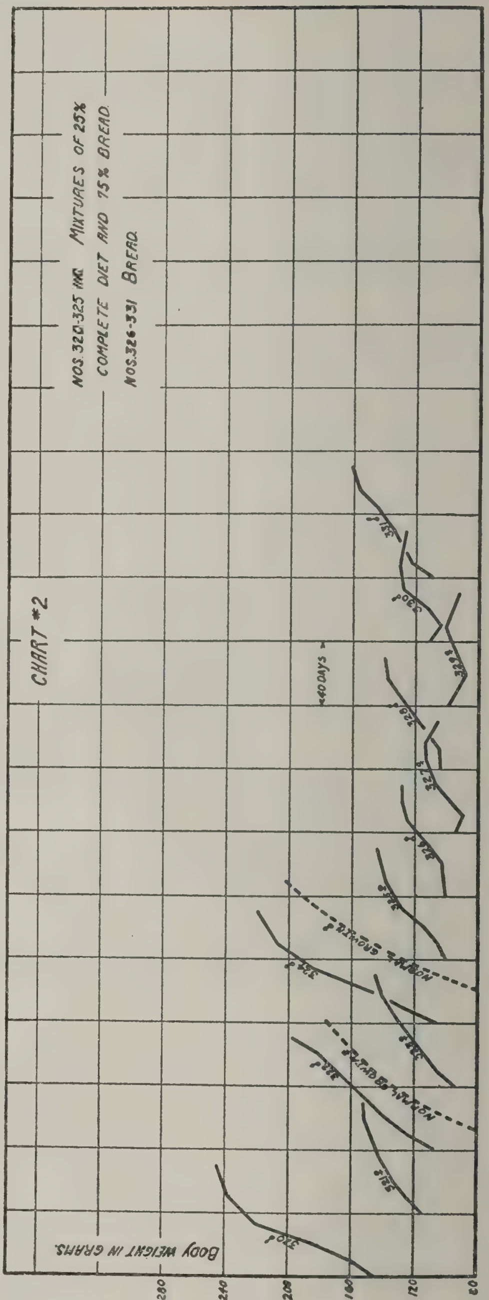
| Animal No. Sex | Constituents of "Complete" Diet in Grams | | | | | | Constituents of Bread in Grams | | | | Constituents of Combined Diets in Grams | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diet | Total Intake | Protein | Nitrogen Free Extract | Fat | Ash | Protein | Nitrogen Free Extract | Fat | Ash | Protein | Nitrogen Free Extract | Fat | Ash |
| 302—m | “Basic or Complete” | 712 | 131.60 | 386.80 | 109.10 | 26.60 | | | | | | | | |
| 303—m | “ | 711 | 131.40 | 386.20 | 108.90 | 26.53 | | | | | | | | |
| 304—m | “ | 720 | 133.10 | 391.00 | 110.40 | 26.85 | | | | | | | | |
| 305—f | “ | 551 | 101.90 | 299.30 | 84.43 | 20.55 | | | | | | | | |
| 306—m | “ | 666 | 123.10 | 361.70 | 102.10 | 24.84 | | | | | | | | |
| 307—f | “ | 618 | 114.20 | 335.70 | 94.69 | 23.05 | | | | | | | | |
| 308—m | 25% Bread | 722 | 96.85 | 284.50 | 80.26 | 19.54 | 28.07 | 138.90 | 8.83 | 3.50 | 124.92 | 423.40 | 89.09 | 23.05 |
| 309—f | “ “ | 731 | 98.06 | 288.00 | 81.27 | 19.79 | 28.43 | 140.60 | 8.95 | 3.55 | 126.49 | 428.60 | 90.22 | 23.34 |
| 310—m | “ “ | 681 | 91.35 | 268.30 | 75.70 | 18.43 | 26.46 | 130.90 | 8.32 | 3.30 | 117.81 | 399.20 | 84.02 | 21.75 |
| 311—f | “ “ | 649 | 87.06 | 255.80 | 72.14 | 17.56 | 25.23 | 124.70 | 7.93 | 3.14 | 112.29 | 380.50 | 80.07 | 20.70 |
| 312—f | “ “ | 662 | 88.82 | 260.9 | 73.60 | 17.92 | 25.70 | 127.40 | 8.10 | 3.22 | 114.52 | 388.30 | 81.70 | 21.14 |
| 313—f | “ “ | 673 | 90.28 | 265.30 | 74.82 | 18.22 | 26.18 | 129.50 | 8.24 | 3.27 | 116.46 | 394.80 | 83.06 | 21.49 |
| 314—m | 50% Bread | 753 | 65.24 | 191.60 | 54.06 | 13.16 | 56.71 | 280.50 | 17.84 | 7.08 | 121.95 | 472.10 | 71.90 | 20.24 |
| 315—f | “ “ | 694 | 59.96 | 175.80 | 49.69 | 12.10 | 52.40 | 259.10 | 16.48 | 6.54 | 112.36 | 434.90 | 66.17 | 18.64 |
| 316—m | “ “ | 727 | 62.98 | 185.00 | 52.19 | 12.70 | 54.79 | 271.00 | 17.24 | 6.84 | 117.77 | 458.00 | 69.43 | 19.54 |
| 317—f | “ “ | 710 | 61.52 | 180.70 | 50.98 | 12.41 | 53.51 | 264.60 | 16.83 | 6.68 | 115.03 | 445.30 | 67.81 | 19.09 |
| 318—m | “ “ | 770 | 66.55 | 195.40 | 55.14 | 13.43 | 58.15 | 287.60 | 18.29 | 7.26 | 124.70 | 483.00 | 73.43 | 20.69 |
| 319—f | “ “ | 704 | 60.89 | 178.80 | 50.47 | 12.30 | 53.11 | 262.80 | 16.70 | 6.62 | 114.00 | 441.60 | 67.17 | 18.92 |
| 320—m | 75% Bread | 705 | 29.61 | 87.00 | 24.54 | 5.97 | 77.25 | 382.00 | 24.30 | 9.64 | 106.86 | 469.00 | 48.84 | 15.61 |
| 321—f | “ “ | 550 | 23.09 | 67.82 | 19.14 | 4.65 | 60.29 | 298.20 | 18.96 | 7.52 | 85.38 | 366.02 | 38.10 | 12.17 |
| 322—m | “ “ | 612 | 25.71 | 75.54 | 21.31 | 5.18 | 67.10 | 331.80 | 21.11 | 8.37 | 92.81 | 407.34 | 42.42 | 13.55 |
| 323—m | “ “ | 565 | 23.72 | 69.69 | 19.65 | 4.78 | 61.91 | 306.20 | 19.47 | 7.73 | 85.63 | 375.80 | 39.12 | 12.51 |
| 324—m | “ “ | 669 | 28.09 | 82.54 | 23.29 | 5.66 | 73.30 | 362.50 | 23.06 | 9.15 | 101.39 | 445.00 | 46.35 | 14.81 |
| 325—f | “ “ | 491 | 20.61 | 60.54 | 17.08 | 4.15 | 53.81 | 266.20 | 16.54 | 6.71 | 74.42 | 326.74 | 38.62 | 10.86 |
| 326—m | All Bread | 429 | | | | | 60.82 | 300.80 | 19.14 | 7.59 | | | | |
| 327—f | “ “ | 377 | | | | | 53.44 | 264.30 | 16.81 | 6.67 | | | | |
| 328—m | “ “ | 480 | | | | | 68.05 | 336.50 | 21.40 | 8.49 | | | | |
| 329—f | “ “ | 293 | | | | | 41.55 | 205.40 | 13.07 | 5.68 | | | | |
| 330—m | “ “ | 397 | | | | | 56.28 | 278.40 | 17.70 | 7.02 | | | | |
| 331—f | “ “ | 517 | | | | | 73.30 | 362.40 | 23.05 | 9.15 | | | | |

The total food intake and the amounts of proximate constituents of the diets have been calculated to their equivalent in calories as shown in Table III.

The average food intake of the two groups of animals which received the diets containing 25 and 50% of their calories as standard milk bread was higher than that of the group which received the diet containing 75% of the milk bread. The tendency of the latter animals to eat less food was due to loss of appetite and may be connected with the decrease in vitamin B brought about by reducing the basic diet to 25% of the total calories.

The results reported on growth are based





on a relatively short period of observation and are being continued to include a longer life span of the animal.

The further extension of the experiments for more complete information on the further effects of diets containing relatively large amounts of bread is obviously necessary.

The growth curves in Charts 1 and 2, however, indicate that generalizations on the "limits of safety" in relation to bread consumption are much over-emphasized.

TABLE III.

**Food Intake in Terms of Calories.**

| Animal Number and Sex | Diet | Total Calories "Basic" or "Complete" Diet | Total Calories Bread (Milk) | Total Calories Combined |
|---|---|---|---|---|
| 302—m | "Basic or Complete" | | | 3056 |
| 303—m | “ | | | 3051 |
| 304—m | “ | | | 3090 |
| 305—f | “ | | | 2365 |
| 306—m | “ | | | 2858 |
| 307—f | “ | | | 2652 |
| 308—m | 25% Bread | 2248 | 747 | 2995 |
| 309—f | “ “ | 2276 | 757 | 3033 |
| 310—m | “ “ | 2120 | 704 | 2824 |
| 311—f | “ “ | 2021 | 671 | 2692 |
| 312—f | “ “ | 2061 | 685 | 2746 |
| 313—f | “ “ | 2097 | 697 | 2794 |
| 314—m | 50% Bread | 1514 | 1509 | 3023 |
| 315—f | “ “ | 1390 | 1394 | 2784 |
| 316—m | “ “ | 1462 | 1458 | 2920 |
| 317—f | “ “ | 1428 | 1424 | 2852 |
| 318—m | “ “ | 1544 | 1548 | 3092 |
| 319—f | “ “ | 1413 | 1414 | 2827 |
| 320—m | 75% Bread | 687 | 2057 | 2744 |
| 321—f | “ “ | 536 | 1605 | 2141 |
| 322—m | “ “ | 597 | 1786 | 2383 |
| 323—m | “ “ | 550 | 1648 | 2198 |
| 324—m | “ “ | 652 | 1951 | 2603 |
| 325—f | “ “ | 478 | 1430 | 1908 |
| 326—m | All Bread | | 1619 | |
| 327—f | “ “ | | 1422 | |
| 328—m | “ “ | | 1811 | |
| 329—f | “ “ | | 1105 | |
| 330—m | “ “ | | 1498 | |
| 331—f | “ “ | | 1950 | |

## *National Distribution Conference*

THE Chamber of Commerce of the United States, Distribution Department, asks every business man six pertinent questions:

1. Looking for a barometer?
2. Have you analyzed your advertising?
3. What do trade abuses cost you?
4. What are your costs?
5. Are your methods the best?
6. How does legislation affect your business?

These are answered by the reports from six separate committees of nationally known business men who were appointed one year ago to study the fundamental facts of American distribution methods.

More than four hundred pages of well written business information and explanatory tables or charts make up the set of six books. The Distribution Conference in Washington, and their printed reports of their findings are judged to be the most important thing the Chamber has done. One interested member wrote: ''The Conference itself and the Committee Reports were for me a perfect gold mine of information.''

An ever increasing number of our members are seriously studying their own distribution methods in the light of business information from other industries, with a view to being in step with changing conditions. To these the six committee reports will prove invaluable, and they are recommended likewise to every man in the industry, baker or allied tradesman, who recognizes efficient distribution as essential to his particular business.

The reports may be secured separately, or in a complete set, at the cost of $1.50 from Alvin E. Dodd, manager Chamber of Commerce of the U. S. A. The titles of these reports are:

1. Collection of Business Figures.
2. Trade Relations.
3. Market Analysis—Advertising and Advertising Mediums.
4. Expenses of Doing Business.
5. Methods of Distribution.
6. Conditions Affecting Distribution.

More detailed information concerning the contents of these booklets can be obtained in a folder from the Trade Promotion Department of the Association.

# Our Future Flour Supply*

By Carl L. Alsberg

*Food Research Institute, Stanford University*

TO THE average person wheat is just wheat and flour just flour. Home economists, however, are well aware that this is far from the truth, that there are hundreds of cultural varieties of the wheat plant differing from one another as greatly as do white, red, and yellow roses, and that the same variety of the wheat plant will produce grain differing very considerably in character according to the climatic and other cultural conditions under which it is grown. They know also that for practical purposes wheats may be divided into two great groups, hard wheats and soft wheats. The hard wheats contain relatively much gluten and gluten of special characteristics. From them a flour may be produced with which it is comparatively easy to bake good bread. The soft wheats as compared with the hard wheats contain relatively little gluten and usually a less plastic gluten ,and the flour produced from them cannot so easily be converted into good bread.

What is the situation with reference to the available supply of the two kinds of wheat? The hard varieties of wheat are produced chiefly in the states of Minnesota, North Dakota, Montana, Kansas, and Colorado. They are also produced in parts of South Dakota and of Nebraska and in a few other rather limited areas. If we assume that all the wheat of all these states is hard wheat—which is by no means the case—then the total hard wheat production during the last ten years has averaged something over 386 million bushels. This kind of wheat cannot be produced in other states because the climate is not suitable. Hence the possibility of increasing the production of this sort of wheat is limited to the possibility of increasing acreage and yield in these states. Neither can be expected to take place except under the stimulus of very much higher prices than now prevailing. Without such stimulus hard wheat production is most likely to stand still or even decline under the inroads of mixed farming. Even under stimulus of very high prices very definite limits are set by climate to the possible increase of hard wheat production. We cannot look forward to any natural unstimulated increase.

### *Soft Wheats Are Plentiful*

What is the situation with reference to soft wheat? It is produced over all the wheat growing territory of the United States except in the hard wheat states above mentioned. The total yearly wheat crop of the United States for the last ten years has averaged something over 837 million bushels. This is an unusually high figure because it includes the war years. As we have seen, the average crop of the hard wheat states has been about 386 million bushels. Subtracting the latter figure from the former we arrive at 450 million bushels as the figure for the average soft wheat crop of our country. The figure is probably materially too low. Now as soft wheat can be produced almost anywhere in the more humid part of the country, except in a part of the South Atlantic and Gulf States, it follows that our production of soft wheats might be greatly increased if there were even moderate price inducement.

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* Presented before the Food and Nutrition Section, American Home Economics Association, San Francisco, August, 1925.

Thus it is evident that the position of the two classes of wheat is very different. We cannot indefinitely increase our production of hard wheat. There are no great areas with climate suitable for hard wheat production now unutilized. We can increase our soft wheat production very easily by offering suitable inducements to the wheat grower.

### *Hard Wheats Growing Scarcer*

It is obvious, then, that we face no shortage of soft wheat. But what is the situation in regard to hard wheat? In the year 1923-24 we used in this country over 668 million bushels of wheat for all purposes: flour, seed, feed, and the rest. Hence our hard wheat production was only in the neighborhood of half—probably materially less than half—of our wheat consumption. As our population increases in numbers this discrepancy between our hard wheat production and our consumption of wheats of all kinds will undoubtedly become even greater, for there is little prospect of increasing hard wheat production. It is, therefore, not astonishing that hard wheat in ordinary years is usually much higher in price than soft wheat. The year 1924-25 in this respect was exceptional. Moreover, the prices paid for different parcels of hard wheat vary enormously. It is not at all unusual for a given parcel of wheat to fetch a premium of 25 to 40 cents a bushel above the average price for that kind of wheat. The premium is paid if the wheat has more than the ordinary amount gluten and the amount of the premium is commonly proportioned to the amount of the gluten as determined by chemical analysis. The fact that such high prices are paid for much of the hard wheat crop is clear proof that there is no excess supply. Indeed, so short was the production of high-grade hard wheat in the year 1923-24 that, despite an import duty of 30 cents a bushel, there was a not inconsiderable importation of hard Canadian wheat in that year. The importation was so substantial that it was followed by the raising of the tariff from 30 cents to 42 cents a bushel, the rate now effective. We could hardly hope for better proof that a shortage of high-grade hard wheats is impending.

Is this impending shortage of high-quality wheats a serious matter? Personally I think not if we will frankly face the situation and take the steps necessary to substitute, so far as required, the abundant soft wheats for the scarce and high-priced hard ones.

In order better to understand the steps necessary to accomplish this, let us consider what it is that causes millers to pay such high premiums for particularly good hard wheats. They do so in order to satisfy the demands of their customers, the commercial bread bakers and the housewives. Cracker and cake bakers are not an important factor in the situation because they prefer soft wheat flours.

### *The Baker Prefers Strong Flour*

For a number of reasons the bread baker wants flour with as much gluten in it as he can possibly get. Perhaps the most important reason is that such flour yields the greatest number of loaves of bread. More water is required to make dough of the right stiffness. Therefore, more loaves are obtained to the barrel of flour. The number of loaves a baker gets from each barrel is of course a very important factor in determining his profits. But there are other reasons for the baker's preference for these flours with much gluten, the so-called strong flours. Less care, less skill is required to bake good bread from these flours than from the soft wheat or so-called weak flours. The length of time a strong-flour dough may be fermented may be varied to a considerable extent without spoiling the bread. A weak-flour dough is easily ruined unless great care be taken to ferment it for exactly the proper length of time. Thus bakers prefer strong flours, both because of the greater bread yields and because they permit greater leeway in bread manufacturing operations.

The housewife also prefers strong flours. As she is not interested in bread yields, she does not insist as does the baker upon getting the strongest possible flours, those with the greatest amount of good gluten possible. Unconsciously she does insist, however, on getting moderately strong flours; and this is because such flours are dual purpose flours. They will produce good bread as well as good biscuits, cake, and cookies. To use them requires the minimum of skill and attention. The housewife may know nothing of the distinction between strong and weak flours. She merely learns by experience that she has fewer failures in baking both bread and cake with certain brands than with others. These brands are the moderately strong flours.

### *Is Premium Wheat Necessary?*

The result of these demands of bakers and housewives finds expression in the great premiums which are paid for strong wheats and which are undoubtedly an important element in the market price of flour. If the demand for strong flours continues or even increases as it has for the last decade, the premiums on strong wheat must rise still further and become a still more important factor in the price of flour. The price of flour, I take it, is a mattter in which we are all intensely interested as a factor in the general cost of living. We must, therefore, ask ourselves the question: What can be done to keep the price of flour at reasonable levels?

The obvious answer is to lower the demand for strong flours. Is this possible and how may it be brought about? Personally I believe it to be quite feasible. I believe it can be brought about by education of bakers and housewives to make satisfactory products from weaker flours. With the education of bakers we are not here concerned. Suffice it to say their education is being attempted by a number of agencies such as their own trade associations, their trade press, the American Institute of Baking with its recently established school for bakers, and various other governmental and private agencies. With the education of housewives the American Home Economics Association is, however, deeply concerned. By educating them I believe it can make an enormous contribution to the national welfare.

### *Home Baking Wastes Strong Flours*

What form should such education take? The baker can be taught how to make good bread from the less hard wheats. To attempt similar education of hundreds of thousands of housewives, is, for the present at any rate, a rather hopeless task. There is, however, another way to accomplish a very material result. The first ste pin this direction would be to spread knowledge concerning the difference between our two types of flours, strong and weak flours, or as they are sometimes called, bread and cake flour. It is a fact, I believe, that tens of thousands of women know nothing of such a distinction. To them flour is just flour. In addition to this distinction they should be taught that it is an economic waste to use strong flours to make biscuits and cake and to thicken soups and gravies. The yshould be encouraged to keep on hand both types of flour to be used each for the purposes for which it is best suited. This would not have been feasible ten or fifteen years ago when flour was sold at retail only in fairly large packages. Today when flour is commonly sold in paper bags containing only a few

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pounds it is quite feasible for a woman to keep on hand both kinds of flour.

To some this may seem a visionary, impracticable scheme, for there is no inducement for a woman to take the bother. Since many of the cake flours now on the market are as high priced as bread flours, she would often make no saving to compensate for the slight trouble. Many brands of cake flour are high priced because they are a fancy, choice, special article designed to be used for the finest kinds of cake. If there were a demand for the ordinary grades of soft flour, millers would jump at the chance to supply it and at a price materially lower than that of good bread flour. One of the greatest worries of the miller today is how to get enough hard wheat to keep up the strength of his brands. A household demand for soft flours would relieve him to no inconsiderable degree from such worries.

### *A Contribution to National Welfare*

If such a practice could be made at all general, the economic advantage to the nation would be enormous. It would contribute to stabilizing the price of flour at a reasonable level. It would minimize the effect upon price of years of wheat crops of poor quality. It would contribute to reducing the risk the miller has to bear in regard to his ability to get strong wheats and thus compel him to do business on a smaller margin of profit.

The question appeals to me of such importance that I have ventured to lay it before this association of home economists. If the members could in any way be instrumental in increasing the demand of the housewife for weaker flour and in lessening correspondingly her demand for strong flour, they would—at any rate in my opinion—make a most important contribution to the national welfare.

## *Brown Bread Porridge*

SOMETIMES the moral reflection which I always look for at the end of a story either does not come or else it is positively immoral. There is, for instance, the tale of the life of the old woman upon whose headstone I once looked in a little country village in England.

"She lived to be 107 years old," the sexton told me when I, as a dutiful tourist, went to look upon the grave. "As a young woman she used to tramp every day—rain or snow—across these moors with a horse and cart. And she worked every day up to within six months of her death."

"And in all her life," he said with pride, "they say she never ate anything but brown bread and porridge."

Of course, that explained the stretch of years and the fearful hardiness, for on such a diet moderation would be enforced. One simply could not approach brown bread and porridge for the thousandth time in a year with a sharp-set appetite. So there is the desired moral reflection, after all.

But was it worth her while to live for 107 years on brown bread and porridge?

—**John Pilgrim.**

—**Chicago Daily News, Dec. 19, 1925.**

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If it is definitely known that a bakery is spotlessly clean, that the technique of all operations is beyond reproach in cleanliness, that all bakers are healthy, and that the product from the time it leaves the oven until it reached the consumer is well protected, I see no reason why that particular bakery should not share most liberally the patronage of the public.

—Marvin F. Haygood, M.D., C.P.H.,
Health Officer, Knoxville, Tenn.

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"Where there is no bread everything is for sale."

—**XVth Century.**

# Pie Our Sentimental Dessert

By Dorothy Dayton

*in The Restaurateur*

**Our interest in pie goes beyond our personal desire for more pie. Rather it concerns the nutritional value of pie and the opportunity commercial pie bakers have for making pie which will rival and indeed excel the product from the home kitchen. In this excellent appreciation of pie Miss Dayton quotes famous hotel chefs as her authorities. It should spur professional pie bakers to finer accomplishments.**

IN high places as well as low the great American pie stands without a rival. It is the laborer's standby, the clerk's hasty lunch, the business man's dessert par excellence. And any movement to make the pie bigger and better should have the backing of all true Americans.

With Congress storming for better pie, and the Pennsylvania Railroad having ordered inch-thick pies on all its dining cars as a sure means to encourage a pie hungry nation to travel, the pie is fast assuming national importance.

For the pie is still all mixed up with sentiment and the art of pie making is a strong factor in preserving the sanctity of the great American home. As for foreigners, they absorb pie and American ideals in the same breath, as it were.

At least all this is the consensus of the opinions of a number of hotel officials and chefs interviewed to-day to learn if pie is holding its own in spite of the steady encroachment of French ideas in cookery.

It is. At New York hotels such as the Ritz-Carlton, the Waldorf, the Roosevelt, the Pennsylvania, the Biltmore and the McAlpin, where it might reasonably be expected that something more fashionable than the humble pie would be the leading dessert, it was estimated that at least 35 per cent of the total dessert orders are for pie.

### *Pies Stir Up Sentiment*

Nearly all of the pie orders, at least in the more fashionable places, are from men. It may be very American, and not at all fashionable, and Friend Wife may be doing her best to cultivate her spouse's taste to better things, but he remains true to pie.

More than that, the eminent Oscar of the Waldorf declares it is impossible for an American man to look at a piece of pie without immediately becoming sentimental. The minute he sees pie he thinks of home and mother, and perchance of wife, if she isn't too modern to be a real piemaker.

It is the great link, holding a man's heart to the hearthstone. If a man brags about his wife's prowess in making pie it's a sure thing than man won't stray far afield. His wife has an invisible chain of flaky crust to keep him forever toeing the matrimonial mark.

That is the reason, Oscar says, that the average hotel pie is so unjustly maligned. It isn't that the pie itself isn't as good as mother used to make, but that the sight of pie immediately makes a man sentimental. The pie recalls the home more poignantly than any other dish, and the poor man can scarcely eat the hotel pie for the lump in his throat. And as he sits contemplating it a great wave of love and loyality rises up in him to explain: "It isn't like the pie that mother used to make!"

The pie, Oscar says, may, in point of fact, be a whole lot better. And the pie that one mother makes may be something entirely different to the neighbor's son. Or does a mother or a wife really succeed in putting some thing more than fruit and filling between the flaky crusts?

### *Calls It Women's Masterpiece*

While Oscar was offended that his chef's prowess as a pie maker should even be suspected of being inferior to the home product, the chef at the Roosevelt, Roger Cretaux, frankly admitted that "while all other forms of cooking may be a man's art, pie baking is a woman's art."

Cretaux believes that no man can ever approach a woman as a pie maker. And while he believes that his under-chefs are excellent pie makers they do not make pie like mother.

"I don't know why it is," he said, "but it is true—a man can't make pie. I don't know what it is a woman does to it, but a woman's pie has a different taste. Yet it seems that a woman must make her pie in her own home. If she tries to commercialize it the pie loses something. Yet in every other line a good French chef can excel the housewife."

Cretaux, who has been chef for the Ritz, the Fifth Avenue Restaurant and the McAlpin during his eight years in this country, says pies were his first stumbling block in America. They are seldom seen in France. The Frenchman finishes his dinner with a little wine and cheese, and his wife probably has an eclair, or some dainty mixture dessert with a good sauce or whipped cream.

The American woman is not particularly fond of pie, either. It is almost exclusively a man's dish, he finds. And when a convention of business men meet, apple pie a la mode is the favorite dessert. Nothing else can take its place. Like the Congressman, they must be 100 per cent American and have their pie. Fancy pies, the Frenchman's first inclination, are not tolerated.

### *Apple Pie Leads Them All*

And apple pie is always the favorite even though men always insist on having the whole repertoire repeated by the waiter, only to order apple pie in the end.

At smaller restaurants the pie orders run as high as 90 per cent of all desserts, and in some restaurants in the business section no other dessert but pie is sold.

The tea room run by women who are good pie makers always have a large patronage of men. But there are few of these in New York. One New York woman, in the pie business on a large scale, is said to have made a small fortune.

The pie, of course originated in England with the meat pie and it is mentioned frequently in nursery rhymes. It remained for America, however, to make the pie her own—the great national dish—the cementer of home ties.

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Laxative food does not simply mean food that contains a quantity of cellulose or roughage—although that is important. Laxative food in the best sense means food that is so perfectly digested that the end products resulting from digestion are so constituted as to give the organs of elimination just the right amount of work to do.

—Winifred Stuart Gibbs.

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Thackery had no thought of balanced rations when he lyrically translated the inception of young Werther's romance in these appetizing phrases:

Werther had a love for Charlotte
Such as words could never utter;
Would you know how first he met her?
She was cutting bread and butter.

# Newer Nutritional Knowledge

## *How Scientific Studies of Nutrition Are Developing a Finer Appreciation of the Role of Food in Creating and Maintaining Normal Health*

FIFTEEN years ago we gave little concern to the kind of food we ate. We were interested chiefly in the quantity of calories which came to the table and in the methods by which they were prepared for serving.

Few bakers thought of their products in terms of their food value or the role they played in creating healthy children or energizing the men who did the world's work. Today the situation is wholly changed. The baker has awakened to find himself recognized as a most important personage in the field of adequate nutrition. American Institute of Baking has established a department of Nutritional Education which is devoted to assembling and sending out the important facts of nutrition.

Much of the progress toward adequate nutritional information has come through the home economic departments of our land-grant colleges. A recent bulletin of the Bureau of Education, Department of the Interior, sets out the development of this important work so definitely that the following abstracts of the section on foods and nutrition prepared by Flora Rose of Cornell University are quoted.

"At the present time, the whole subject of education in foods and nutrition is centering around the application of knowledge of food preparation and principles of nutrition to the larger problem of feeding human beings.

The biological method of studying food values has come into prominence. The chemical laboratory almost overnight was partitioned to make a place for cages of small animals. Foods which until then had been tested chiefly in test tube and beaker were hereafter to be tried out on the living animal. During the last decade the life histories of many generations of rats, guinea pigs, rabbits, and pigeons have yielded secrets which had been guessed but never before revealed. The changes in subject matter which this method of testing foods has introduced are no more important than the changes which have come in quieter periods of growth, but they are more dramatic in consequence.

Long before 1910 there had been accumulated the great body of technical fact which is the foundation of nutrition subject matter today. During the present period, however, the study of protein has shifted from what was largely a quantitative study to a qualitative study, with the knowledge that proteins vary greatly in their building, repairing, and maintaining values.

### *Mineral Constituents are Important*

Ten years ago mineral matter was given second place in any discussion of human nutrition needs. At the present time, it is never discussed as mineral matter but in terms of its elements, calcium, phosphorus, iron, iodine, and the others. The relationship of insufficient amounts of one or more of these elements to faulty nutrition is becoming a matter of common knowledge.

The whole subject of the vitamins has been opened up and three of these substances in foods or properties of foods have been widely discussed and definitely named. A possible fourth vitamin has recently been considered. The vitamin development represents the most spectacular occurence in nutrition in the decade.

Although the energy value of food and human energy needs had been well declared before this decade, there have been important additions to our knowledge of specific conditions affecting energy needs. This has been particularly true in the case of energy metabolism in disease and during the growing period.

### *The Balanced Diet is the Thing*

These changes have caused a shifting of emphasis not only from food preparation to food selection but also within the subject of food selection itself. Courses in nutrition are now beginning to deal with the practical phases of feeding rather than the technical phases of food composition. Diets are discussed less frequently from the standpoint of the foodstuffs that they contain, such as protein, carbohydrate, and fat, and more frequently from the standpoint of the foods themselves, such as milk, cereals, roots and leaves of vegetables.

The buying and cooking of food no longer constitutes the bulk of information which is both available and usable. Equally ready at hand is the whole story of how these foods will affect the human being. The change is from the technical to the functional. It is necessary, however, to keep clearly in mind the fact that this change depended upon the development of the subject matter to a point where it was useful.

Contributions to the body of subject matter are now being made by research within departments of home economics themselves, as well as in the laboratories of other departments.

### *Educational Methods Changing*

Methods of education in foods and nutrition have followed the trend of modern educational procedure; that is, a shifting from the old lecture method of teaching to the modern problem-project method. The change in emphasis here again has been from the technical to the practical. It has become widely apparent that the teacher is obligated not only to give facts but to make the facts function, not only to give the principles of feeding but to follow them up with the right practices. The school lunch, the nutrition class or clinic, mid-morning feeding, the baby in the practice house, and the practice house itself are all illustrations of this point.

The changes in both content and method of courses in foods and nutrition in schools and colleges during the last decade have been directed toward giving students not only a knowledge of subject matter but an enthusiasm for establishing food practices which will produce healthy human beings.

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## *More About Milk Solids*

There is a world of difference in the sound and in the taste of bread and milk and bread and water. Judged in several ways, there is a similar difference between bread made with milk and bread made with water.

Milk and wheat are an excellent food combination whether they are mixed before or after baking. The milk supplies food materials that the wheat lacks, and vice versa. Milk, for instance, happens to be particularly rich in calcium, while wheat contains very little. Calcium is a mineral that the body needs constantly for building and repairing bones, teeth, and other tissues. Unfortunately the average American diet is often rather low in calcium. Milk bread is therefore one way of giving the body a more generous supply of this valuable mineral. Bread made with milk also tastes richer and does not grow stale so rapidly as when water is used in mixing the dough.

# Books for the Baking Laboratory

DIET AND HEALTH WITH KEY TO THE CALORIES, by Lulu Hunt Peters, A. B., M. D., 127 pp. Illustrated. The Reilly and Lee Company, Chicago. Price $1.00.

In a semi-humorous vein Dr. Peters has given us a really worth-while book on the subject of diet. Her "preliminary bout" as she calls the first chapter, contains a definition of the term calorie and shows how it is used in measuring our food needs. The next chapter has to do with the number of calories required by people under different conditions of life. Then comes a chapter on the various classes of food, followed by tables showing the weights of various foods in 100 calorie portions. There is some discussion as to the amount of protein required and some of the arguments of the vegetarians and the meat eaters regarding the relative merits of vegetable and animal protein. A short chapter is dedicated to thin people who are trying to gain; but by far the greater part of the book is taken up with the ever interesting topic "How to reduce."

Dr. Peters' discussion of the reducing diet is both clear and convincing. She even allows people to have candy if they want it, and this is going rather far according to the teachings of some other dietitians. Those who wish to reduce, according to Dr. Peters, should first learn their caloric maintenance requirements and then decide on the number of daily calories which will be enough lower than maintenance to compel the body to consume its own fat in order to make up the deficit. It then becomes a sort of budget system. If you wish, once in a while, to use some of your calories for luxuries like candy, well and good, but the total intake for the day must not exceed that decided upon.

In her suggestions for reducing Dr. Peters has not overlooked one thing which some dietitians seem to have forgotten, and that is that people needing such a diet require that their food be balanced just as much or even more than do normal people. The ratio of proteins, fats, and carbohydrates must be taken into consideration as well as the presence of an adequate supply of vitamins and mineral salts.

In the final chapter Dr. Peters gives an interesting account of an experience of hers in the Balkans when with the American Red Cross. Her life there was a much more active one than she had been accustomed to, consequently she neglected to count her calories, relying upon the vigorous exercise required by her work, to keep her weight down. She found however, that exercise alone would not accomplish this, regardless of how vigorous it was.

Taken altogether, Diet and Health is an admirable little book and well worth reading and following by those interested in nutrition, and especially by those who desire to lose weight.

R. H. S.

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## *Abstracts of Technical Articles*

**Selected for Baking Technology from Chemical Abstracts**

**A Theory of Colloidal Behavior.** By C. A. Swanson, Kans. Agr. Exp. Sta., Manhattan, Kans.

The particle is the center around which ideas in colloid chemistry are organized in the same way as a molecule is the organizing center in general chemistry. The dough is a mass of starch and protein particles, covered by thin films of water. The surface tension forces inherent in the films of water bind the starch particles together the same as the particles of clay are held together. These forces also help to hold the protein particles together. However, the colloidal behavior of dough cannot be accounted for on this basis alone. The asumption is made that the protein particles form chains or strands which have a rubbery elasticity and these strands are matted together in a mass ordinarily known as gluten.

The quality of dough is determined by the number of particles present which form the strands and by their inherent structure and also by the environment of the particles. The number of particles is related to the quantity of protein in the flour, and their structure to the quality. These two are determined when the wheat kernel is formed. The manner of coherence among the particles and hence the quality of the gluten strands depends also on the environment of the particles. This environment consists mostly of water and substances in solution in this water. These substances affect the electrical condition, and hence the binding force among the particles. The environment controls the conditions for yeast growth. Hence the environment as a whole is mostly under the control of the baker.

**Relation of viscosity to the baking quality of flours.** H. Luers and M. Schwarz. Z. Nahr. Genussm. 49, 75-89 (1925).—Chemical analyses give no measure of baking quality. Viscosity of flour-$H_2O$ mixtures was determined at various concentrations both in the cold and at higher temperatures. As the temperature rises viscosity goes through a maximum due to gelatinization. A constant is determined depending upon concentration of flour in $H_2O$ and viscosity of the heated suspensions; this is proved to vary directly with the volume of the baked loaf. Good results are obtained on flours from different sources.

Frank E. Rice.

**Distinction between wheat and rye flour.** Hans Geilinger and Karl Schweizer, Mitt. Lebensm. Hyg. 16, 95-9 (1925).—Gury's method (C. A. 8, 379) was found the most satisfactory.

C. G. King.

**New observations and a reinterpretation of old observations on the nutritive value of the wheat plant.** E. B. Hart, H. Steenbock, G. C. Humphrey and R. S. Hulce. J. Biol. Chem. 62, 315-22 (1924).—Satisfactory calving may be obtained in cows on a diet of wheat and wheat straw, if this is supplemented with bone-meal, NaCl and cod-liver oil. The failure to secure good results in earlier experiments (C. A. 7, 109; 11, 2689) was probably due to Ca and vitamin A deficiency and not the presence of a toxic material.

I. Greenwald.

**Quick colorimetric test for the classification of flours.** Paul Bruere. Ann. Fals. 18, 161-5 (1925).—The test consists essentially in determining the Ph colorimetrically by means of 4 indicators (0.04% bromothymol blue, 0.04% bromocresol violet, 0.04% bromophenol blue, 0.02% Me red) by preparing the sample as for a Pekar color comparison, adding a drop of each indicator, immersing in neutral $H_2O$ for a few seconds, and comparing the colors with those similarly obtained with standard samples and with starch having ph 7. With freshly milled flour (not over 75% extraction) from sound wheat, the average ph is very close to 6 and with time falls gradually to not less than 5.2. The technic is described and the interpretation of the colors obtained is discussed, more particularly from the standpoint of detecting chlorination and treatment with mustard gas. On drying the sample, the colors obtained are stable and are preferable to Mansfield Clark's color scale. A. Papineau-Couture.

**The production of experimental test biscuits and their volume measurement.** J. R. Chittick and F. L. Dunlap. Cereal Chem. 2, 87-94 (1925).—The basis of the method developed depends on the seed displacement and the use of a series of brass rings, inside of which the biscuits are baked. The manner of making the rings is given in detail. A record of a comparative bake of biscuits made from two different baking powders is given and the full details of how to make the calculation of the volume from the record.

R. Buchanan.

**Soy beans and soy-bean bread.** J. Fiehe. Z. Nahr. Genussm. 49, 45-51 (1925).—On account of the high protein, soy-bean products should be adapted to human food, particularly where there is a scarcity of meat, eggs and dairy products. Soy-bean flour contains no starch, the 29.12% N-free extract consisting of dextrin and sugars chiefly. The fat is so easily oxidized, becoming rancid, that the product does not keep well. The cake obtained from pressing out the oil is better adapted for human food. Flour may contain 15% of this without injuring its baking quality. This addition increases the protein 10%.

Frank E. Rice.

**The effect of additions of fluorine to the diet of the rat on the quality of the teeth.** E. V. McCollum, Nina Simmonds, J. Ernestine Becker and R. W. Bunting. J. Biol. Chem. 63, 553-62 (1925).—Rats fed a diet of wheat 67.5, casein 15, whole milk powder 10, NaCl 1, $CaCO_3$ 1.5 and butter fat 5% had excellent teeth but those fed the same mixture in which part of the wheat had been replaced by a mixture of equal parts of dextrin and NaF so as to give a concentration of 226 parts NaF per million all had defective dentition. The lower incisors tended to break off easily; the upper ones did not meet the lower teeth but grew back in a circle and finally penetrated the roof of the mouth. The surfaces were dull and opaque, lacking the usual polish, and had transverse corrugations. The molars were less affected but also lacked the usual polish. The bones of the skull were more porous than normal. The experimental animals were shorter and more stocky than the controls.

I. Greenwald.

**Bread cereals from physiological and economical standpoint.** M. Rubner. Naturwissenschaften 13, 645-51 (1925).—A review.

B. J. C. Van der Hoeven.

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# Simple Test for Adequacy*

By Winifred Stuart Gibbs

*Food Specialist*

ARE you trying to walk in the middle of the dietary road, keeping a weary eye open for the pitfalls of prejudice on one side, of incomplete knowledge on the other? Then, and we say it reverently, may the Lord help you!

For, no matter how carefully the layman has sought out authoritative advisers; no matter with what zeal he has applied himself to the study of their diets, when in his casual reading he comes full on statements to the effect that "White flour and ultra refined sugar are actually costing so and so many lives yearly," well, in spite of himself, there is a sinking fear! Has he, for example, been responsible for cutting short the earthly career of some one dear to him, simply because he has insisted on giving that person white flour or sugar?

There is one way in which to banish utterly such ghastly thoughts. Submit the home diet to a simple test, easy to plan, easy to apply.

Take white flour for example, as that is the "danger" most often attacked. Here are the test questions. If satisfactory answers can be returned to each of these, there need be no shadow of self-reproach hanging over the home dietitian's head.

1. Have you ever limited the day's ration, or even one meal, to white flour foods? Serving literally nothing else?

2. Have you at two meals served butter, milk, potatoes, and at least one leafy vegetable (spinach, turnip or beet greens, etc.) and fruit?

It is a fairly safe assumption that the average housewife will be able to answer "No" to the first question, "Yes" to the second, in which case, all is well.

The case for sugar and other so-called "dangerous" foods may be summed up in practically the same way. In fact, careful attention to the foods listed in question 2, these to be accompanied by white flour products, is far more conducive to health than is the eating of "dark flour" with a meagre ration of milk, fruits and vegetables.

One refrains purposely from multiplying words, even for the laudable purpose of giving reasons! Let the facts themselves sing into the public consciousness as facts, and much will have been accomplished.

And now a word for the defendants!

Let us not in our eagerness to be broadminded about white flour foods, flour or sugar, or what not, swing too far the other way. Let us not forget that the unrefined flour, the unrefined sugar, do contain elements not found in their supposedly more aristocratic brothers and sisters. But neither let us forget that for certain individuals dark flour products are difficult of digestion. Again, let us, while we are in the way of exercising our memories, also remember that even normal individuals digest white flour bread more completely than that made of unbolted grains.

So, after all, this keeping in the middle of the dietary road resolves itself into a simple common sense procedure. A traveller's guide might well begin and end with the words: "An abundance of milk, leafy vegetables and fresh fruits will almost automatically make any mixed diet safe for nutrition!" Its title page might well bear the words: "Information Plus Application, Minus Fads!"

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# BAKING TECHNOLOGY

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# Changing Food Habits

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STANDING between the producer of every form of food materials and our great family which gathers three times daily around 25,000,000 dinner tables is the mother in the home kitchen and professional cooks in every public eating place. And with the development of our newer civilization which is emancipating women from almost every form of household labor home cooking is rapidly being replaced by delicatessen dietaries and restaurant dinners.

We are approaching the day when it will be impossible to talk about the ''pies Mother used to bake'' and our criterion of super food quality will rather be ''those wonderful pastries we used to get every noon at Henrici's.''

With this change of standards of cooking from the home to those set up by the professional cook and baker there comes a great responsibility to the restaurant industry. It is not necessary to dwell upon the fact that for generations the French chef has worn the laurels as the master cook and that the French cuisine is regarded as the best in the world. These marks of high approbation have no doubt been well bestowed. But in the interest of the growing number of people on this side of the Atlantic who can never hope to taste the delicacies of Parisian restaurants but who do long for well cooked and well served food is it too much to hope that in the near future our bakers and cooks will have evolved a high standard of American dishes which will gratify our palates and nourish our bodies more acceptably than has been the case up to this time?

Every country has its national dishes. We have many of them. If we live in New England we love baked beans, broiled scrod and Johnny cake. In the South we swear by the excellence of beaten biscuit and hunt our vitamins in turnip greens and sour belly. In Indiana fried chicken with hot biscuits makes the Hoosier mouth water, and everywhere the fine bread and pastries from modern bakeries are obtainable for our tables. These homely dishes have acquired a reputation which cannot be broken down.

### *Tell Me What You Eat*

There is an old saying, "Tell me what you eat and I will tell you what you are." In these days of food faddists who would mold our tastes to conform to their own ideas of what sort of food is best for us, whether we want to eat it or not,—who would have us eat no meat at all or live on raw food, or take our cereals au naturel with all the husk around the digestible kernel—it would be hard for the most skillful diagnostician to pry far into the life of a modern consumer. We have gone too far beyond the simple life, whether it be in eating or working or vacationing. The coolie of India may reflect the scanty and limited diet which is his portion. The poorer classes of the South may in their lack of vigor and ambition reveal the fault of a diet too closely held to soda biscuits and fat meats, and the excessively fat patron of our dining rooms is easily read as the victim of his gross appetite.

But while it is only in these exceptional cases that the old adage holds true it is also a fact that we are rapidly approaching an era in which far more attention is being given to the form and quantity of our food. We once were interested only in satisfying the demands of our appetites. We wanted food and it didn't much matter what it was. Those were the days of our childhood, days before we were taught in school that a quart of milk a day was necessary if we were to grow strong, days before calories were printed on menu cards and vitamins discussed as familiarly as our neighbors.

Now we have learned to think of our food as a sort of human fuel which is prepared in a thousand delectable ways and fed into our bodily furnaces by the aid of fine china, polished silver, soft music,—or insane jazz—and pleasant companions.

And just as the engineer secures the kind of fuel best suited to the need of his boiler and feeds it in quantities best adapted to produce the desired results we are learning how to select our food that it may nourish us most completely, sustain us for our work in office or shop, repair the waste of a round of golf or the exhaustion of after-dinner speeches. Those of us who are approaching middle age are looking rather carefully into the choice of foods which do not add to our burden of flesh, mothers are seeing to it that their children get the growing bodies which they have lately learned must be added to their diet; and that their voracious demands for energy foods are satisfied with extra portions between meals.

### *There is an Increased Interest in Food*

In fact there is everywhere a greatly increased interest in food and nutrition. And the business of eating is assuming a most important place in life.

The American dietary is perhaps the most generous, both in variety and quantity, of that of any people in any period of the world's history.

No food is so scarce that it is not readily obtainable by those who fancy it. We like strawberries better in January than in June. Cantaloupes from Colorado taste sweeter than melons from nearby gardens. Cherries from California and Oregon and Michigan have helped us to forget the dying cherry trees in our backyards. Mutton from Australia or Illinois, fish from the Gulf of Mexico or some Canadian lake, beef fed on the pampas of Argentine or the pastures of Iowa farmers, all comes to our table in perfect condition and at a cost so low that every one, whether he be stock broker or plasterer, clerk or attorney, capitalist or laborer may indulge the call of his appetite. Our need is not that of the other half of the world's population which we are told has gone always hungry to bed and whose stomachs continually cry for bread but rather of consumers who have at our command the food resources of the world.

### *Children Need More Food*

What we need is a still better knowledge of food selection and a better appreciation of the value of proper preparation. How many of us know, for instance, that in spite of our abundant food supply, in spite of the ability of almost everyone outside the small class which because of low mentality, sickness or misfortune does not have the price of sufficient food, and in spite of the efforts of teachers and dietitians to send the facts home to parents through the mouths of children taught in every schoolroom, how many of us know that the average child needs from twelve to fifteen hundred more calories of food per day than he is now getting. How many of us appreciate the fact that undernourishment is not the result of poverty but of ignorance, and that there are almost as many undernourished children in the homes of the wealthy as there are in the tenements of the poor?

An article called "The Challenge of the Children", printed in Child Health Magazine, by Dr. William Palmer Lucas, Professor of Pediatrics, University of California Medical School, reads:

"A statistical study of nutrition made by Gephart at the St. Paul School in Concord, New Hampshire, where most of the boys were over 12 years, indicated that the average healthy boy had an approximate intake of 5,000 calories, or 1,500 to 1,800 calories more than is ordinarily allowed for these ages. Statistical studies on the growing child lead one to conclude that food calories should be given more liberally. The large number of undernourished and underweight children in our schools show that children as a rule receive too little rather than too much food."

Do you appreciate the significance of these short sentences? Can you measure the need for an increased food intake amounting to a pound of bread a day, or its equivalent in some similarly well balanced food, among a child population of more than 25,000,000? While we folk of older years who have long since ceased to worry about an adequate diet for our growing needs and who now hunt assiduously for types of food which will preserve our youthful figures, are without doubt eating all the calories we should, we must give careful attention to this problem of the undernourished child for much more is at stake than the mere increase of bread or meat or milk consumption. Hungry children do poor work at school. They approach the time when they will join the ranks of the workers without having acquired the stature and vigor which might have been theirs if they had been better fed in their childhood. And so some part of our huge investment in education has been wasted and the productivity of the oncoming generation is lessened.

But it means something to have the

facts. Without a plan the pile of bricks dumped on the vacant lot will never make a house. The nutritional plan is approaching completion. Each nutritional fact is a brick which will be built into a well balanced diet.

### *Some of the Bricks*

The first fact to build into the ideal diet is this: no single food is a complete food. Milk, it is true, is Nature's food for the nursing child. But milk is not a satisfactory food for adults. Meat is not a complete food, nor is fruit or vegetables or even bread itself. And it makes little difference whether these foods are eaten in their original state, potatoes in their skins, rice and wheat in its branny covering, sugar in the cane, or whether our fruits and vegetables are peeled, our wheat milled to fine, white flour, our sugar purified by crystallization.

Even whole wheat fails almost as completely as the finest flour to satisfy the demand for balanced protein, adequate mineral salts, the varied vitamins. All this nutritional information will sometime become a knowledge. Already the simple facts of food and its relation to health are taught in the school room. Physicians and dentists and nurses are adding a knowledge of modern food facts to the means by which they support health, build and preserve strong teeth, and teach the role of food to their patients.

### *Restaurant Menus Also Teach*

Millions are now lunching downtown or dining in public restaurants. The public eating places are each year entering into sharper competition with the dining rooms which used to be the heart of the home. Under the stress of an economic and social system which makes home service increasingly expensive and inefficient, the necessity for going outside the home for food will become greater. It is a fortunate thing for those who find their food outside the home just as they do their daily work, that the modern restaurant is increasingly appreciative of the need for serving something more than mere food to its patrons.

The cafeteria service which allows one to choose from a variety of foods displayed before him is a lineal descendant of the old fashioned public dining table on which the entire meal was placed in generous portions. A still more satisfactory service is found in the food combinations listed for breakfast, luncheon and dinner in which stewards and chefs with an increasing intelligence have brought together an adequate supply of the essential foods. Such portions are not overbalanced as to fat or protein content and they are often so skillfully chosen that the essential vitamins and mineral contents are assured.

### *Some Suggestions Are Dangerous*

This is a modern service. It has much to commend it but it may also be potentially dangerous. For instance, a restaurant in one of the large cities recently placed two pigeons in the window which were fed an inadequate diet until pathological conditions developed. A folder was then distributed to every patron of the place headed, "the whiter your bread the sooner you are dead." Visitors to the restaurant were further advised that "in order that our customers might have the opportunity of absorbing, with ourselves, the vivid lesson of this experiment, we determined to bring the cage inside and place the birds on exhibition." The leaflet then contributes an additional opportunity for the study of the pathological condition of one of the birds by advising, "we shall continue to feed him for several days, allowing our patrons the privilege of observing his growing paralysis."

Fortunately but few restaurants have employed these morbid methods of influencing the appetites of their patrons. The Thompson restaurants print a beautiful booklet, illustrating in colors typical Thompson meals and showing the total food and energy value of the meal in terms of fats, protein, carbohydrates, total calories and vitamin potency. This is real information and when supplemented as it is with an intelligent discussion of how balanced meals mean better health and what calories and vitamins have to do with a good luncheon or a substantial dinner, it makes the intelligent use of good food something more than mere eating.

The great chain of Child's restaurants publishes a dietetic food list in which, after discussing the balanced diet in terms of all essential food ingredients, it lists each of its food specialties in terms of the amount served and the calory equivalents of the protein, fat, and carbohydrate contents. Objection may properly be made to such a list that it converts the enjoyable task of eating into the application of mathematical formulas. It is true that we should know how to count our calories if we would help Mother Nature in the job she has been so successful at through countless generations, but most of us are still measuring our food intake by our appetite appeal rather than by calorific tables. That is the reason why the American dietary is, on the whole, superior to the dietary of other peoples. For in our ranging of the world's food larders we bring to our tables all the elements we need. And because we do select so widely, because with few exceptions our diet is varied with every meal, we run little chance of faulty nutrition.

### *Food Selections May Be Bad*

It has been noted by some students of nutritional problems that the selective habit which while not uncommon is still not normal. Some children dislike milk although it is essential to their growth. Some people feel the day but poorly begun unless its starts with hot biscuits. Many otherwise normal individuals dislike salads. This list might be extended almost indefinitely for even among apparently normal people there are those with unwise nutritional habits for whom some one should prescribe a remedy.

Is there not at least a hope that among the growing group of restaurateurs whose life work is administering to the needs of hungry men there may develop a feeling of responsibility which will never be content with filling the demands of their patrons? May it not be practical to assure a better nutritional service by using bread rich in the solids of milk, and by increasing the use of salad dishes, rich in vitamins though low in calories, cannot a perfect sandwich be built which will be greatly different from the weak and pallid suggestion of a sandwich now so often handed out, devoid of butter, sliced in inhuman machines which work with precision of a microtome and handed out by millions daily to assuage the hunger of half hour lunch timers. Vice-President Marshall once said, after listening to solemn senators discuss the state of our country until he was bored to the point of extinction, ''What this country really needs, gentlemen, is a good five cent cigar.'' What every lunchroom really needs is a good sandwich, made of real bread, real butter, real meat and with a real lettuce leaf built into its structure.

## *B. T. in the Agencies*

THE staff of another advertising agency, this time in the far west, depends on the assistance of Baking Technology to keep them informed about nutrition facts of importance in their clients' advertising copy. They write:

''I am requisitioning 'your Baking Technology to keep ourselves always cognizant of the work being done by your Institute in the general realm of nutrition as well as the special field of baking.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

H. E. BARNARD, Editor

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MARCH 15, 1926

### *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Then and Now*

THEN—the baker worked from twelve to sixteen hours per day. It was not unusual to finish the week working all night Friday and all day Saturday. The baker's wife boarded and often "slept" the help. The baker's ambition was to retire on his savings and enjoy a few years of rest and freedom. He was not regarded as an important individual in the business life of the community. Most baker's shops were in cellars, poorly ventilated; all work was by hand, hard labor, long hours. He was striving for a competence with limited opportunities for education. He had but a vague consciousness of his responsibility and duty to the public. He had small knowledge of nutrition and the part his products played in providing wholesome nourishment for all ages and all classes of people.

NOW—the baker works eight to ten hours per day. Ambitious ones can work longer but machinery and improved methods have done away with the necessity for long hours. The baker is an important factor in his business community and he is to be found on the directorate of banks, prominent in social and fraternal organizations, identified with many business enterprises and creating his own trade associations, which will compare favorably with those of any other industry. He studies how to improve his products and processes. He is not looking forward to retiring—no, he enjoys his work and wants to keep right on at his business as long as he is able. He plans trips and excursions for himself and his family. His trade association and its conventions afford him opportunity for social contact and travel and keep him abreast of the times in matters of education.

There are some bakers who say—"Conditions in the baking business are not what they once were, times have changed." It is true that times are changing, they always have changed and always will change and the unfortunate man who will not or cannot change with them is left behind.

In 1850 the population of the United States was 23,000,000; there were 2000 baking establishments and 8000 people engaged in the business. Seventy-five years later the population has grown to 110,000,000; baking establishments have mounted to 20,000 and the number of persons engaged in the business more than 210,000.

Yes, times are changing; our country is growing bigger, our industry is growing bigger. The individual baker is growing bigger. His opportunities are greater.

And as never before he realizes that his business success will be limited only by the quality of his service.

L. J. Schumaker,
*President, American Bakers Association.*

## Institute Conferences

IS your Production Department aiding or retarding your progress?

From the number of Bakers attending the Cake Conference at American Institute of Baking in Chicago on Monday and Tuesday, February 22nd and 23rd, we would surmise the latter to be the case.

Never saw such interest in production, and if all of the questions asked had to be answered, the Conference would still be in session.

Two days, long to be remembered by those attending as the most co-operative meetings of Bakers for the good of the Industry and its customers of which we have any record.

Even in your wildest moments you could never picture a group of Bakers swapping formulae, correcting each other's errors in the use of raw materials, and honestly fighting for an opportunity to arise to a point in question that would help their neighbor—and yet, that is just what happened!

I thought the Millennium had come, and on second thought realized it had, sure 'nough, for the Bakers, in the form of American Institute of Baking, under whose auspices this Conference was held.

And that's not all the American Institute of Baking can do—it can help you, as it has helped others, when you support it by becoming a member of American Bakers Association.

Send in your application TODAY!

Cordially yours,
American Bakers Association,
L. A. Schillinger,
*Chairman, Membership Campaign.*

## The Facts Are Now Available

IS it possible to analyze the conditions which have produced the amazing developments of the baking industry in the past three years or to prophecy the effect they will have both on the independent baker and the public? No profitable discussion of the subject will be had until the basic facts of the combinations in the industry are understood. These facts have been brought together and analyzed and interpreted by Dr. Carl L. Alsberg, Director of the Food Research Institute in publication number 3 of the Institute.

This most important discussion of the mergers which have been formed in the past three years is reviewed on page 94 of this issue. Those who wish to read the book, and no one who is interested in bread will fail to do so, may secure it by sending a check for $2.00 for a cloth bound, $1.50 for a paper bound, copy to the Librarian, Louis Livingston Library of Baking, American Institute of Baking, Chicago, Illinois.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of BAKING TECHNOLOGY, published monthly at Chicago, Ill., for March, 1926.

State of Illinois, } ss.
County of Cook, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared H. E. Barnard, who, having been duly sworn according to law, deposes and says that he is Editor of BAKING TECHNOLOGY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.
Editor, H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

2. That the owners are:

American Institute of Baking, a Corporation formed not for profit,
H. E. Barnard, Manager,
L. J. Schumaker, President, acting for American Bakers Association.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None.

H. E. BARNARD.

Sworn to and subscribed before me this 25th day of February, 1926.

(Seal) Rosabelle E. Priddat, Notary Public.

(My commission expires August 24, 1926.)

# Moisture in Flour

By Dr. W. W. Skinner

*Assistant Chief, Bureau of Chemistry, U. S. Dept. of Agriculture*

**Every careful flour buyer wants information on three points, ash, protein and moisture. No standards have been set for ash or protein except as they may conform to specifications but for many years the moisture content has been held to 13.5 per cent. Changing analytical methods have justified a change in the standard. The address of Dr. W. W. Skinner, Chairman of the Standards Committee, is a thoughtful discussion of the subject.**

I ACCEPTED with pleasure the invitation of your program committee to attend the annual convention of the Pennsylvania Millers at Harrisburg, Jan. 14th, because of the opportunity it affords me to make contacts with a portion of an industry which is vitally concerned with certain problems which are before the Food Standards Committee. It was not, however, without some hesitation that I agreed to open the discussion of the subject of a proper standard for moisture in flour since the matter is now before the Standards Committee for review, and I should regard it as indeed unfortunate if anything I might say at this time should be construed by you or others as a prejudging of a matter which is now before the committee of which I have the honor to be chairman. I should like to have it understood, therefore, that I have come here seeking information and advice from practical men in the industry, and in order to get such advice I want to lay before you the problem with some of the facts and some of the evidence which have come before the Standards Committee in the hope that we may sift out the errors and resolve the doubts in order to arrive at a fair and just conclusion. And if, perchance, I seem at times to be presenting an argument it is for the purpose of clearing up doubts and uncertainties rather than with any thought or purpose of convincing you by such presentation.

### *The Required Moisture Content*

To consider the matter in an orderly fashion, may we not do as the lawyers do when there are matters at issue, and attempt to formulate certain stipulations which shall form the basis of our conference.

First: I think we can agree that moisture, or in plain terms, free water, is a natural constituent of your raw material, wheat, and that it appears in varying amounts in all mill products and is therefore a natural and normal constituent of all flour.

Second: We can agree that in the manufacture of wheat into flour there is a certain optimum moisture content of the wheat which best aids in the production of the highest quality of flour. In the tempering of the wheat to produce this condition it may be necessary either to add or subtract water to reach this optimum condition.

Third: That the moisture content of the wheat and within certain limits the moisture content of the flour can be and is controlled by the miller.

Fourth: That the addition to the wheat of water in excess of that needed to obtain a maximum extraction of standard quality, or the retaining in the flour by the miller of an amount of moisture in excess of that dictated by the best milling practice is economically unsound and a detriment to the consumer.

### *What Is Moisture in Flours*

Now, in regard to the first stipulation, it would seem that there could be no argument or difference of opinion, since it is almost like stating the obvious. We might, if time permitted, at this point discuss at length a definition of moisture and such a discussion would without doubt be of material profit. If our minds are actually to meet and run in parallel lines, which is necessary if we are to reach a satisfactory conclusion, it is essential, to convey to each other our thought in language and terms which are precise, exact and sufficient. When we use the term "moisture" as it relates to such products as wheat, flour, and bread and a number of other food products, it connects the uncombined water held by the material, and is called by the chemist absorbed or adsorbed water, the water which by appropriate means may be removed or may be conceived of as being removed without change in chemical constitution, and the only physical change is that due to the desiccation resulting from the removal of all of the uncombined water. I have been quite surprised in a diligent search of the literature to find a failure upon the part of authors and workers to precisely define just what is meant by the term "moisture." Reams of paper have been used in recording work done upon methods for the determination of moisture, and in every book on methods of analysis is to be found explicit directions for determining what is termed moisture, but little is said, and this generally by inference, defining moisture. This is undoubtedly responsible for a part of the confusion which exists in discussing moisture content of products, and about which I shall have something further to say when I come to the discussion of methods for its determination. I want to go on record here as saying that what I mean when I use the term "moisture" in a food product such as wheat and flour and bread is the water which may be added to or taken from a product without altering its chemical composition, and I do not mean water of constitution or crystallization, etc.

### *Sound Milling Practice*

In regard to the second specification there seems little room for doubt about the meeting of minds, since it deals with facts easily ascertained and appreciated perhaps by all directly or indirectly interested in the milling industry. It is not within the purview of my discussion to consider in any detail the technical questions of milling, even if I were thoroughly competent to do so, which I am not, especially before an expert body of millers such as is assembled here. But in order to keep the record straight and in order to show the attitude of the United States Department of Agriculture on this phase of our discussion I should like to quote from a recent bulletin of the Department on this subject.

> *"At the beginning of the process of milling, the miller gives much considereration to the question of the moisture content of his raw material. He knows that in order to secure the highest yields of flour and to insure its greatest purity, the pericarp or outer coatings of the wheat kernel at the time of grinding must be of a certain toughness, and the endosperm, or inner part, of a certain mellowness. The degree to which these properties are possessed by the different parts of the kernel is influenced largely by the amount of moisture present.
>
> "Wheat when received at the mill is seldom, if ever, in the best condition for milling, its moisture content being too high, too low, or not properly distributed throughout the kernel. To

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* U. S. Dept. Agriculture Bulletin No. 788, May 15, 1919, p. 2. "Moisture in Wheat and Mill Products." By J. H. Shollenberger, Bureau of Markets.

acquire the right moisture content for the outer and inner parts of the kernel, thereby insuring the best possible milling condition for different wheats, requires the application of various methods of tempering. These methods may consist of a single, or successive, or of combined applications of water, heat, or steam, working through a period of time, ranging from a few minutes to as much as 36 hours, in order that the moisture may be properly distributed within the kernel.''

### *Controlling the Moisture Content*

This brings us to our third stipulation, the control of the moisture content of the wheat and of the finished product. In the milling of the wheat there may be and generally is, a variation in the moisture content of the finished products. This variation may depend upon the amount of water used in the tempering of the wheat and the character of the subsequent milling. The evidence on this seems quite clear and convincing, although the evidence in regard to the facility with which the final moisture content of the mill products may be controlled by the miller is not conclusive. That it is possible as a matter of good milling practice to control the water content of the tempered wheat within narrow limits is the purport of much of the evidence presented before the Standards Committee. For example, at a hearing before the committee, a representative of one of the largest milling companies in the country stated: ''Wheat as received at the mill may range in moisture from 10 to 17 per cent, but the average will run from 12½ to 14 per cent. It is impracticable to mill grain which has as low moisture as 13½ per cent.'' Another representative of the millers said, ''Every miller with whom I have come in contact insists that it is absolutely impracticable to mill wheat successfully either as to quality of product or the amount of recovery without a moisture content of between 13 and 14 per cent, regardless of the kind of wheat.'' He presented charts covering a four years' period of operation, showing an average for that period of 14 per cent during the summer months and rarely exceeding 13 per cent in the winter months. I have recently had the opportunity to review some data regarding the moisture content of wheat after tempering as practiced and controlled in some of the representative mills of the Middle West. In one series of results representing 58 mills grinding hard wheat in the month of September the average moisture of the wheat was 14.9 per cent with a maximum of 16 per cent and a minimum of 12.87 per cent, and in another series of results from 22 mills grinding soft wheat in the month of November the average was 14.53 per cent with a maximum of 15.6 and a minimum of 13.5 per cent. There is much other data upon which I could draw for illustration but enough perhaps has been cited to show that in the tempering process it appears the miller is able to control the moisture content of his raw material within fairly close and well-defined limits, and it is necessary for him to do so in order to produce the desired milling results from a given character of wheat.

Recently argument has been presented which contends that the moisture in the wheat at the time it is sent to the rolls must be higher than the 14 or 14½ per cent which was claimed to be ample by the millers at the hearing in 1915 and that now optimum tempering requires at least as much as a maximum of 15.25 per cent of water. This is of course an important matter, since the moisture in the tempered wheat does exert a variable but distinct influence upon the quantity of moisture remaining in the finished product—the flour.

### *What Is a Fair Moisture Limit?*

This brings us to the question—what is a proper and fair limit for moisture in a normal flour? To arrive at the answer to this question, which was before the Standards Committee in the eighties and nineties, much work was done by chemists in the Bureau of Chemistry and elsewhere to determine the normal constituents of commercial flours of that period. Time does not permit of a review of this data in any great detail, and it is perhaps sufficient to say that as a result of the work done by the Bureau of Chemistry and others it was shown that normal American flours of that period had an average moisture content of about 12½ per cent, with a maximum of about 13.3 per cent. In Part 9, of Bulletin 13 of the Bureau of Chemistry it is stated by Dr. Wiley and his co-workers that a representative high grade American patent flour contains approximately 12.75 per cent of moisture. In determining what should be a fair limit for moisture in flour the Standards Committee in 1904 reached the conclusion, with the data then available, that no flour ought to contain moisture in excess of 13½ per cent, and the limit or standard was fixed at that amount. I would much prefer not to call it a standard, since the word standard is used to convey more than one thought or idea. The word is frequently used to connote a condition of excellence. It is not so used when talking of flour, but indicates rather a legal limit for an inert material, that is, water, which has no value but is necessarily present as a result of manufacturing practices, such as is pepper shells in pepper, or curd in butter. It was considered at the time of the adoption of the limit in 1904 that the 13½ per cent moisture was a liberal limit and that the best milling practice indicated that either 12 or 12½ per cent was an amount of moisture which might ordinarily be expected. This figure seemed at the time to fully meet the limitations of the millers and generally received their endorsement.

### *The Miller's Point of View*

At the hearing in 1915, to which I have before referred, a representative of one of the largest millers in the country stated, "In tempering the wheat the moisture is usually raised to 14½ as it goes to the rollers. As is passes over the rollers the moisture disappears and it is very rarely that the flour runs over 12.8. It runs from 12.2-12.8. It varies somewhat as to the particular flour and its relation to the outside shell." Continuing, he said, "Because of the kind of weather and the conditions that the flour is going to encounter in shipment a thousand miles or so to the coast we are compelled to bring our flour down to the minimum amount of moisture that we can get by these separations. We would release more (flour) if we dared to do it but we don't. Our practice has been and still is to mill approximately 12.8 — sometimes over. Sometimes we have trouble in keeping it down in July and August. Our idea is that the 13½ per cent is the maximum of moisture and in order not to go above that we have to have a margin of safety and so we go under quite a little."

Another representative of the millers testified, "You have wisely said that the maximum content should not exceed 13½ per cent." Again he said, "It is well within the scope of necessity—that moisture content." Another miller said, "Now you have a 13½ per cent basis which is practicable in every way; that every decently operating miller can live up to it on that basis." Still another said, "I don't believe there is any miller here who has tried to add excessive moisture and our present standard of 13 to 13½ moisture content would prohibit anything of that kind, and it is a splendid thing, too."

### The Cost of Excessive Moisture

I have recounted these few excerpts from the mass of evidence before the committee to show that the concensus of opinion in 1904 and again at the hearing in 1915 was to the effect that a 13½ per cent moisture was a maximum limit that ought to be tolerated in flour at any time, and that the best millers could work within the range of 12.5, a full per cent under the limit of 13.5 of the standard, and perhaps even lower. Now, the question arises, has the program in the art of milling, in the application of scientific control, and in the development of mechanical equipment been such as to permit or induce the miller to add more moisture to his flour than was practicable or safe for his predecessor of 25 years ago? I wonder if you realize what an increase of one per cent of moisture in the manufacture of flour would mean if applied to the total output of the United States. In 1924 there was produced the almost astounding amount of 132,514,000 barrels of flour by the mills of America. Each additional one per cent of water above that absolutely necessary to economically produce the flour would mean an inclusion in our total supply of flour of a weight of water equivalent to approximately 1.3 million barrels of flour. Not only would this serve no useful purpose but would cause an actual loss and a dissipation of our natural resources. Stated in another way, every 1 per cent additional water adds approximately 2 pounds per barrel to the flour. On the basis of an annual production of 132,514,000 barrels this would mean 132,500 tons of water, an amount which would require the railroads to furnish 4,412 cars to haul, and much other unnecessary waste of energy in transportation and handling.

### Has Moisture Limit Been Raised?

It is alleged that millers can and do take advantage of the great progress in the art of milling to standardize their product and to regulate their output so that it may run a little under but just as close to the legal limit of 13½ as possible, and it has been a matter of very great interest to us to note that the millers who in the early days thought that the average moisure should be around 12 or 12½ per cent and that 13½ per cent moisture should be the very outside limit, now produce products running consistently between 13 and 13½ per cent. What are the factors which have wrought this change? Is it due, as some contend, to the greatly increasing use of the harder wheats which require a longer tempering and a larger amount of moisture in the wheat as delivered to the rolls? Is it due to the development of equipment which may control not only the moisture in the grain as it goes to the rolls but controls the temperature and humidity in the mill so as to affect the final output? Is it controlled in any other way? I am asking this question to elicit specific information. As bearing on this matter I have here in my hand a photostat copy of a device recently advertised in prominent trade journals which pictures the device and reads as follows:

> "Simple, reliable humidifiers. Heat and humidity have a great bearing on the profits of a flour mill. Our fifty years of experience in these and allied lines will help you obtain a profit which is legitimately yours."

### Does Bleaching Increase Moisture?

The third question to which I should like an answer is to what extent do the processes for bleaching or maturing the flour affect the final moisture? Above I referred to a statement from one of the largest operators in the country, "We could release more (flour) if we dared to do so but we don't. Our practice has been and still is to mill at approximately 12.8 per cent." He stated that the reason he did not at that time dare exceed very much the 12.8 was because of the untoward effect of excessive moisture upon the keeping quality of the flour. Do the chemical agents which are now quite generally advocated for the treatment of the product produce a flour which will keep better, and permit the miller to do now what he emphatically declared in 1915 he did not dare to do? We are told by some that the moisture content of the flour is self-limiting, depending upon the character of the wheat and upon the atmospheric conditions over which it is alleged the miller has no possible control either at the time of or subsequent to the milling operation. In view of what I have said before and from the further fact that in most of the European countries the standard for moisture in flour is much in excess of 13½ per cent, we are a bit skeptical of this statement. And if it is literally true, then indeed there is no need for a standard and we have wasted much effort about something which after all is of only academic interest. In regard to this I admit I must yet be shown.

### *Analytical Methods Have Changed*

It would perhaps be unwise for me to close my remarks on the subject of moisture in flour without saying very briefly something about the methods for the determination of moisture. I hesitate to open this subject, which is a matter of controversy, particularly about the application of methods, about which much has been written in recent years, because I can not at this time undertake to adequately discuss the question. I should simply like to say, however, that the data which I have used and the discussion here presented are based upon the assumption that the amount of free water driven off from the product at 100° centigrade, which is the temperature of boiling water, is to be regarded as the moisture content of the product. This assumption, which was regarded as true in 1904, we now know is not valid. We now know that there is present in the flour, after heating to constant weight at 100° centigrade, an amount of free water which may be removed by appropriate means. New methods have been developed within the last two years by means of which it is now possible to obtain more accurately the true moisture content of flour. Since, however, the standard or limit for moisture originally adopted was based upon an assumption which was regarded as true, it seems not only fair but necessary that the limit or standard if changed be changed by as much as the differential between the assumed moisture and what the true moisture is finally found to be, or that the method upon which the standard was based be continued in use.

Now, in conclusion, just a word about standards or legal limits for the constituents of food products, their purpose and uses. In speaking before one of our national trade organizations recently I said that intelligent and effective enforcement of any law which regulates the character of articles of commerce requires the formulation of definite standards. The necessity for standards is conceded everywhere in that portion of the business world which has to do with barter in commodities, even where there has existed no legal regulation, and thus we find that most of the business of this kind is conducted upon well recognized specifications, either implied or legally formulated into contracts. Without some authoritative control, either by legal enactment or self-imposed through a guild or trade organization, competition tends to reduce commercial ethics to the level of the business standards of the meanest competition. This not only results in fraud and injury to the consumer, but it produces unfair competition.

# The High Cost of Living

IN ONE of the late magazines the wife of a college professor complains that the high cost of living is impoverishing families with middle class incomes. She stresses among other details of her own plight the fact that her milk bill is one-tenth of her husband's salary.

George W. Hinman, writing in the Chicago Examiner, uses this example of discontent to point out that high living costs are after all but a measure of the service we demand for our easy living and for the conveniences which no matter what they cost us we cannot do without. He shows us that the cost of a quart of milk is a typical item by which the ever widening spread between the cost of food at the farm and the table may be explained. "The milk which the farmer sells for six cents and the city man buys for fifteen cents a quart is," he says, "the same sort of test as the beefsteak that costs 50 cents on the hoof and $2.50 on the restaurant table, or the watermelon sold for 10 cents by the Texas farmer and marketed for a dollar at the city grocery.

"It is such items as these that build up the food costs which plague the American people, that help pile up a bill of ten billions for the marketing of ten billions' worth of food, and move the farmers of the United States today to demand some sort of relief from the middlemen who are supposed to absorb more of the money than the farmers themselves get for producing the food.

### *Who Piles Up Costs?*

"Well, then, how about the milk that costs one-tenth of the professor's salary? Who robs the farmer? Who robs the professor?

"There is but one standard answer, the middleman. But a gentleman named Tisdale gives a different tone in the Nation's Business.

"A farmer gets 6 cents a quart for his milk, for example. The city family pays 15 cents. Where do the other 9 cents go?

"Freight and cartage and costs at the country milk station are supposed to take about 2 cents. In the city, the pasteurizing of the milk costs a cent and a half and the trucking both ways a cent more. The expense at the city milk station and delivery of the milk at the family's back door costs a trifle over 4 cents.

"So the quart that costs 6 cents at the farm has accumulated charges that make it cost about 14 2-3 cents as laid down on the door mat. The other third of a cent is the dealer's profit.

"These are Mr. Tisdale's figures. What do they show? They show that the farmer gets less than half the retail price of his milk. They show that the college professor's family—or any other city family—pays two and a half times for its milk what the milk is worth when it comes from the cow. Both farmer and college professor protest. What is the matter? Why is there this big 'spread' between 'producer' and 'consumer'? Formerly there was no such 'spread.' Why now?

### *How We Do It*

"Because in the matter of milk as in a thousand other things the American people have fallen into exacting and luxurious and, one might almost say, lazy habits. That giant fact must be reckoned with always and everywhere nowadays.

"The city family exacts pasteurized milk from its dealer. The Tisdale figures show that this costs about 2 cents a quart. The city family demands, of course, delivery on the door mat before breakfast. That costs 4 cents. If the milk were delivered in bulk at a neighborhood station and fetched thence by the family itself to the home, at least half the 4 cents would be saved. On these two items alone the cost could be reduced to less than 11 cents a quart. But who would advocate the reduction?

"Who would do away with pasteurization? Who would go back fifty years to fetching home his own milk in a pail—incidentally saving also the expense of milk bottles? Everybody in the city and almost everybody in the village calls upon middlemen to do these things for him. And, if the middleman is called upon, he has got to be paid. Hence, 15 cents for the quart of milk even though the farmer gets but 6.

### A Test Case

"This is a plain little story. Mr. Tisdale's part of it is intended to be plain. But, understood and interpreted, it reaches into half the problems of the high living costs in cities and the comparatively low prices obtained by farmers.

"A lot of lessons regarding farm relief and the need of farm co-operation also are wrapped up in the same simple tale. They apply to the whole range of those food prices which make up nearly half the expenses of families with moderate income.

"Of course, the efforts to cut down the 'spread' between farm and city family are worth while and will accomplish some things, but in the long run the city family's demand for all modern improvements, for all sanitary safeguards and for all time saving conveniences has got to be paid for and the price is bound to be high."

### The Only Exception

In all the story of living costs there is but one clear cut exception to the general rule that governs increased rent, labor, food, clothing, fuel and pleasure cost. That is the cost of a loaf of bread. While the primary necessities of life which are included in our need for shelter, clothing and comfort are now costing us several times as much as they did in the dim distant before-the-war days we can still buy the family bread supply for a year for less than a hundred dollars. Bread for the family costs far less than gasoline for the car. It costs but a fraction of the price of movie and theatre tickets. It costs no more that the accident insurance policy of the family wage earner. And yet it supplies in well balanced and desirable forms more than one-third of all the food which energizes and nourishes us.

A loaf of bread is as fine a symbol of thrift and wise investment today as it was when Benjamin Franklin walked down Broad Street with a baker's roll under his arm the day he first set foot in Philadelphia.

## Aesop on Eating

Do you remember the fable maker of ancient Greece and his story of the members of the body that decided in favor of an even distribution of labor, and laid their complaint before the stomach, on the ground that it accomplished far less labor than the hands, feet and teeth? The hands carried no more food to the mouth, the teeth agreed to chew none, the mouth determined to accept none. The stomach was to be "frozen out" for not working equally with the rest. Inevitably the hands became lackadaisical, the mouth was parched, the legs became weak, the head felt heavy. Finally a truce was called, and the dissenters were obliged to confess that in an unobtrusive but invaluable way the stomach had been filling its office all along.

"Without dish and without bread there is no good company."

# New and Refilled Flour Sacks

## *How the Flour in the Package is Affected by the Condition of the Sack*

By H. E. Turley
*Bacteriologist, American Institute of Baking*

ONE of the constantly recurring problems of food and sanitary inspectors is that of suitable containers for prepared foods. For some years they have asked whether or not the custom of using old sacks for packaging flour was in full accord with good sanitary practice.

In an effort to determine the opinion of millers and bakers as to the effect of placing flour in sacks which had already been used one or more times for shipping flour from mill to bakery, we have made some study of the subject. By means of a questionnaire we endeavored to determine whether or not millers and bakers approved of the practice of refilling sacks and in the event the practice was not detrimental to the quality of flour what method of cleaning the sacks before refilling was most satisfactory. The data as to the advisability of the practice we secured was so indefinite as to be of little value. Millers on the whole were opposed to refilling sacks. Bakers were rather inclined to view the practice as an economical one which could safely be indulged in if the sacks were properly cleaned.

A number of methods for cleaning sacks were reported. Some advised washing the sacks; others recommended beating out the flour, still others would accept any treatment which would leave the sacks clean.

But it was impossible to reach any definite conclusions of value either to food officials whose interest in the matter was prompted by their concern over the practice as a sanitary one or to millers and bakers who were interested both in the sanitary aspects of the practice and in the economic value of using sacks over and over again during their useful life.

And so during the past year we have undertaken at American Institute of Baking a further study of the problem, basing our investigations on the bacterial condition of flour shipped and stored in both clean new sacks and old and dirty sacks.

In order to secure typical conditions, five sacks of flour were placed in clean sacks and five sacks were packed in old sacks at the same time by two co-operating mills, one in Kansas and one in Minneapolis. When the flour was received at the Institute it was placed in storage with other stocks of flour and held under conditions normal to flour in storage in bakeries. Soon after the flour was received heavy rains came and during the entire period of the investigation the humidity of the storage room was high.

It was noted that the new sacks were clean and in excellent condition while the refilled sacks were not clean and upon careful examination showed small particles of caked flour imbedded in the fibre of the sack.

The flour was studied for a period of ten weeks, samples being taken for analysis upon receipt of the shipments and each two weeks thereafter, or six times in all.

In taking samples a corner of the sack was opened, and after careful stirring a spoonful of flour was removed to a sterile, stoppered, moisture dish. Twenty milligrams of the flour was then weighed into an aluminum capsule contained in a covered glass weighing dish. This capsule was then transferred to a 500 c.c. Erlenmeyer flask containing 100 c.c. of distilled water. After thorough shaking one c.c. of the solution containing flour in suspension was withdrawn and inoculated into a tube of melted agar and immediately poured into a sterile petrie dish. After incubation at 37 deg. C. for 72 hours the colonies were counted and the results calculated for the number of bacteria in one gram of flour.

| Date of Analysis | Kind of Sack and Flour | Bacteria per Gram of Flour | Mold Colonies in Plates |
|---|---|---|---|
| Upon receipt of flour........ | Kansas—clean sack.......... | 845,000 | None |
| Upon receipt of flour........ | Kansas—refilled sack......... | 1,000,000 | 2 |
| Upon receipt of flour........ | Minneapolis—clean sack...... | 900,000 | None |
| Upon receipt of flour........ | Minneapolis—refilled sack..... | 1,075,000 | 1 |
| At end of two weeks' storage.. | Kansas—clean sack.......... | 850,000 | 2 |
| At end of two weeks' storage.. | Kansas—refilled sack......... | 1,250,000 | 5 |
| At end of two weeks' storage.. | Minneapolis—clean sack...... | 950,000 | None |
| At end of two weeks' storage.. | Minneapolis—refilled sack..... | 1,100,000 | 6 |
| End of four weeks' storage.... | Kansas—clean sack.......... | 1,650,000 | 4 |
| End of four weeks' storage.... | Kansas—refilled sack......... | 2,300,000 | 7 |
| End of four weeks' storage.... | Minneapolis—clean sack...... | 1,500,000 | 1 |
| End of four weeks' storage.... | Minneapolis—refilled sack..... | 1,950,000 | 5 |
| End of six weeks' storage.... | Kansas—clean sack.......... | 3,150,000 | 2 |
| End of six weeks' storage.... | Kansas—refilled sack......... | 3,450,000 | 10 |
| End of six weeks' storage.... | Minneapolis—clean sack...... | 2,900,000 | 3 |
| End of six weeks' storage.... | Minneapolis—refilled sack..... | 3,640,000 | 5 |
| End of eight weeks' storage... | Kansas—clean sack.......... | 4,075,000 | 2 |
| End of eight weeks' storage... | Kansas—refilled sack......... | 4,625,000 | 9 |
| End of eight weeks' storage... | Minneapolis—clean sack...... | 4,350,000 | 5 |
| End of eight weeks' storage... | Minneapolis—refilled sack..... | 4,975,000 | 7 |
| End of ten weeks' storage.... | Kansas—clean sack.......... | 5,175,000 | 3 |
| End of ten weeks' storage.... | Kansas—refilled sack......... | 6,260,000 | 9 |
| End of ten weeks' storage.... | Minneapolis—clean sack...... | 5,950,000 | 4 |
| End of ten weeks' storage.... | Minneapolis—refilled sack..... | 5,800,000 | 12 |

The mold colonies which grew on the plates were also counted.

The accompanying table shows the results of the studies.

It will be noted that the number of bacteria present in the flour was in every case higher in the refilled sacks. But it is also apparent that the difference in bacterial condition is slight and that the increase of bacteria during storage proceeds uniformly in the case of both new and refilled sacks. There is no noticeable difference in the bacterial content of the flour from the two mills, the number present evidently depending more upon the age of the sample than upon the type of sack used. The increase of bacterial count during a week of storage in most cases brought the count of flour in the clean sacks up to the level of the count of the flour in the refilled sacks a week earlier.

There was a similar paralleling of results noted in the number of mold colonies. When the samples were received neither lot of flour in the clean sacks showed mold while one lot of flour in refilled sacks showed one mold colony and the other lot two colonies. Under storage conditions mold slowly developed in every sample although in no case did the number of colonies observed in the clean sacks reach the number in the refilled sacks. In most cases there were from three to five times as many mold colonies observed in the flour in the uncleaned sacks. It should be noted, however, that mold growth proceeded in about the same ratio in all the samples so that at the end of the period the counts on the clean sacks were as high as counts on the refilled sacks a month earlier.

It is not possible to reach any positive conclusions from these preliminary figures. Much more data is desirable, showing the types of bacteria present and any tendencies towards the growth of strains which may have an unfavorable effect on flour strength. It will also be of value to differentiate the molds present and to note whether or not the flour in the refilled sacks reaches a condition in which it is unfit for use more quickly than flour packed in clean sacks.

There is no evidence that the practice of refilling flour sacks introduces any element of impurity or unwholesomeness into the flour. The samples in the unclean sacks are similar in every way to the samples in the clean sacks and when baked make products of equal purity.

It may be that the maturation or aging of flour is influenced somewhat by the character of the sack. The data at hand points somewhat vaguely in this direction, but the effects thus far noted are so slight as to be negligible from the viewpoint of the baker.

The investigations will be continued.

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## *Our Convention Calls Around the World*

"The Australian Federal Master Bakers Association at its Annual Convention held in Adelaide last week appointed me to attend your Exposition and Convention, next year.

"I am anxious to see and learn all I possibly can in connection with the baking trade whilst in your country and would esteem it a favor if you could advise me."

Edgar D. Oldfield,
Golden Grain Bakery, Semaphore Road,
Exeter, South Australia.

## *The Pie Champion*

"WOULD you believe it? When they held a champion pie contest at a state food show in Cincinnati the other day, the first prize was won by a man. No, not a pie-eating contest—a pie-baking contest. The winner wasn't a professional, either, but a mere husband and business man.

"The pie was an apple pie, of such incredible delicacy, lusciousness and substantial merit that nobody has yet had the nerve to attempt a verbal description. The artist who made it is Henry J. Krohne. There was a sensational denouement when the judges, solemnly awarding the prize of a $125 clothes drier to Mrs. Krohne, were told by that modest housewife that it was not she, but Henry, who deserved the drier and the glory.

"Henry, you see, has a flair for pies. He discovered it by accident one time, and now he bakes them all. Mrs. Krohne does the rest of the baking and cooking, but never touches a pie. She is an intelligent woman, and knows and respects genius when she sees it. As for Henry, he has a lovely time making those pies—not to mention eating them. But Henry is modest. He shrinks from the fame that has come to him.

"This little story is passed on for the benefit of a sex that is threatened with eclipse in this feminine age. Man lives by food. Man is what he eats. The crown of culinary perfection is a good apple pie. A man makes the best apple pie—in Ohio, at least. In how many another home and state is there a masculine talent blushing unseen?

"Let genius be sought for and recognized. Give man a chance at the rolling pin and pastry-board. Bigger, better pies is our slogan and we must have them even though it drags men from the office, the factory or the professional chair."

—The Evansville Courier.

# Business Is Policing Itself

## *How Politics and Industry May Work Without Conflict*

IN a recent issue of Nation's Business, P. G. Agnew, secretary of American Engineering Standards Committee, discusses the means by which modern industry is making legislation and litigation unnecessary in the conduct of business. The milling and baking industries have never been standardized either as to the character of raw materials or finished products. There have been no accurate definitions for either flour or bread. The analytical methods used in central laboratories have given discordant and incorrect results and misunderstandings have been general. Of course such a situation is as absurd as it is unnecessary. There are no real differences of opinion as to the basic principles of bread manufacture. But there has never been any opportunity for common discussion of standards, specifications or desirable legislation. The result has been a flood of well intentioned but inadequate legislation, prepared by persons unfamiliar with the subject and enforced by men without knowledge of the industries they presume to regulate.

American Institute of Baking has now become the proving ground of all technical matters which concern the baking industry and its allied trades. It assumes the right to speak for these industries on matters which concern the common weal of manufacturers and consumers.

The following excerpts from Mr. Agnew's excellent article are quoted as an evidence of the practical way by which legislation, specifications, standards, and codes may be efficiently handled.

### *Too Much Law Is Bad Law*

"Our ever-increasing flood of legislation is becoming a matter of national concern. A president of the American Bar Association is authority for the statement that the Fifty-ninth Congress passed 6,750 laws, and in 1915 the state legislatures enacted 15,033 laws. Furthermore, we are faced with a steady stream of city ordinances and of regulations by federal, state and municipal boards and commissions, which have the force of law.

Must these conditions go on indefinitely, laws being multiplied beyond the possibility of enforcement, and beyond the possibility of public understanding and approval? Or are there other and better methods of solving many of the problems which the present flood of legislation seeks to solve?

The problems which we are now attempting to solve by means of the machinery of legislature, court and commission, are in large part industrial, and they are constantly arising from the increasing complexity of our civilization.

Much more than is generally realized has already been accomplished in developing non-legislative methods of solving such questions. The growth of commercial, industrial and professional associations during the last twenty-five years has furnished the background and the machinery necessary to solve such problems through co-operative channels."

### *Legislative Committees Uninformed*

"The reaching of a national consensus on industrial problems, through the statutary-law process, is an extremely difficult matter, the more so that legislation on nearly all such subjects comes within the jurisdiction of the legislatures of the forty-eight states. Since few, if any, members of a legislature have adequate knowledge of such a problem, the initiative and the general direction of legislative movements of the kind are in the hands of interested people outside the legislature—in short, in the hands of the lobby.

In state after state the question is fought out before legislative committees by those groups sufficiently interested and alert to participate. In the great majority of cases the real decisions are made by legislative committees whose members, themselves lacking adequate knowledge of the subject, necessarily have to base their decisions upon the presentations of the case by the parties at interest.''

''The legislative method is not a suitable one for the solution of innumerable specialized and more or less technical problems that arise in the development of industry and business. It does not reflect upon either the ability or the probity of legislators as such any more than the statement that hammer, chisel and saw are not suitable tools for the making of watches reflects upon either the ability or probity of carpenters as a class.''

### *Clear-cut Specifications Necessary*

''The more important phases of the movement for uniformity have, however, to do with specifications as a basis of purchase, methods of test, nomenclature, and dimensional standardization to secure interchangeability of supplies and to further mass production.

Loose phrases in describing products, such as, 'all materials shall be of best commercial quality,' and 'good workmanship shall be required throughout,' which are even yet frequently used in contracts, are but invitations to the law courts. In a wide range of products, such loose phrases are giving place to definite, clear-cut specifications which may be interpreted in the acceptance or rejection of material without danger of misunderstanding by any competent engineer or testing laboratory.

This comes about, first, through the use of private specifications by individual firms, then by industrial groups, and last, through nationally recognized specifications agreed upon by all interested groups. For example, more than 95 per cent of the cement produced in this country now conforms to a single specification.

### *They Eliminate Controversies*

Grades and grading rules are forms of specifications, which enable buyer and seller to speak the same language, thus eliminating disputes and litigation.

Closely allied to specifications are methods of tests, upon which an enormous amount of work has been carried out in this country. These include methods of making acceptance tests for a wide range of apparatus and machinery and of raw and semi-finished materials; such, for example, as ferrous and non-ferrous metals, paints and varnishes, paper, fabrics, tools, electrical machinery, and building materials.

The purpose is to set forth so clearly the technique by which acceptance tests are to be made that any competent inspector can determine readily and definitely whether it comes up to contract or guarantee or not.

The end is not so much to settle controversies as to eliminate the conditions which give rise to them.

The same type of work is being done on an extensive scale in regard to mechanical dimensions in order to insure the proper fitting of parts and the interchangeability of supplies. For example, no less than thirty-two national technical and trade associations and government departments are represented on a joint committee engaged in the standardization of pipe flanges and fittings, while twenty are represented on a similar committee on the dimensions of bolts, nuts, and rivets.''

### *What Are Allowable Variations?*

While the chief advantage to industry

in formulating such "codes" for its own guidance is the great economy made possible through mass production and the resulting simplification in the processes of distribution, there are many other advantages. One of these has an important legal aspect. Disputes as to whether material delivered is in accordance with order or contract lead to a large amount of litigation. To avoid such misunderstandings is not so simple as it might at first appear.

For example, it is not sufficient to say that a shaft shall be 2 inches in diameter. If nothing else but the diameter is specified, a buyer may attempt to reject the material for inaccuracy, no matter how accurate it may be, since it is impossible to make a shaft exactly 2 inches in diameter on account of unavoidable limitations in workmanship. On the other hand, the seller may attempt to supply material so inaccurate as to be unusable and assert that it is commercially accurate.

The solution consists in agreeing upon just how many thousandths of an inch departure from the ideal size shall be allowed for unavoidable inaccuracies of workmanship under normal conditions of commercial production. The amount thus allowed is technically known as the "tolerance."

National agreement has now been reached through the method which has been outlined on standard sizes of shafting, complete with tolerances. The same thing is being done in the case of a large number of industrial products.

In this way litigation is avoided. The facts are made so plain that there is no occasion for going to law, as disputes do not arise.

### *Exact Definitions Avoid Litigation*

Another important line of activity which tends to reduce the work of the courts is in connection with definitions of technical terms used in specifications and contracts and in general industrial transactions. To realize the importance of this, one has but to recall that a large part of the civil cases with which courts deal hinges upon the exact meaning of words and phrases.

As a matter of fact, a large part, perhaps the greater part of standardization, is essentially agreement on definitions. When we agree on specifications for cement we are really agreeing on what we mean by cement, so that we may telegraph, "Send one thousand barrels of cement according to specifications," with the full assurance that there will be no misunderstanding of the requirements.

The same is true of methods of test, of grades and grading rules, and of methods in rating machinery and apparatus.

The whole movement is based upon the principle that purely industrial standards should not be subject to legislative or other legal control, or to governmental pressure of any kind, but that they should be developed and applied through voluntary, systematic co-operation of the industries themselves, though always with the full co-operation of any and all governmental agencies concerned.

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"I noted your letter in the press on the subject of Bread vs. Potatoes. It is of course very timely, and I appreciated it very much because I have put the taboo on potatoes except in rare instances as long as we're paying this high price. There are too many other starch foods and substitutes for potato in the diet which I think should really be used oftener and give potato a rest anyway, so for one I want you to know that your letter was read and duly approved."

—Gladys Russell, Chicago.

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"Bread, butter and good cheese are the right target against death."

# The Calcium and Phosphorus Content of Commercial Wheat Flours

By C. B. Morison and M. R. Reeser

THE following data on the calcium and phosphorus content of commercial brands of wheat flour is presented here for the purpose of supplementing older information on this subject found in the journal literature, and in textbooks such as König (1), Sherman (2) and Leach (3).

This data is also of contemporary interest as it has been obtained from the examination of representative brands of wheat flour manufactured from American wheats by modern milling methods. The samples were drawn from consignments of flour shipped directly from the mill to the American Institute of Baking in the original sacks. The percentages of moisture, protein, and ash are shown in Table I, and were made according to the methods of analysis of the A. O. A. C. (4).

TABLE I.

**Moisture, Protein and Ash of Commercial Wheat Flours.**

| No. | % Moisture | % Protein N x 5.7 | % Ash | Description |
|---|---|---|---|---|
| 1 | 11.31 | 14.03 | 1.660 | Hard Spring, Whole Wheat |
| 2 | 12.65 | 11.03 | 0.438 | Patent |
| 3 | 12.19 | 10.60 | 0.407 | Patent |
| 4 | 13.00 | 10.40 | 0.414 | Patent |
| 5 | 12.33 | 11.38 | 0.438 | Patent |
| 6 | 12.89 | 11.70 | 0.478 | Patent, Hard Winter |
| 7 | 12.81 | 11.35 | 0.454 | Patent |
| 8 | 13.02 | 11.04 | 0.379 | Patent |
| 9 | 13.69 | 8.44 | 0.370 | Patent, Soft Winter |
| 10 | 12.93 | 11.35 | 0.442 | Patent |
| 11 | 12.09 | 13.65 | 0.818 | Clear |
| 12 | 10.46 | 13.05 | 0.419 | Patent |
| 13 | 12.40 | 12.00 | 0.388 | Patent |
| 14 | 11.72 | 10.78 | 0.371 | Patent |

The calcium was determined in the ash obtained by ashing 20 gm. of the flour in a vitreosil dish in an electric muffle at a low temperature, 550° C. circa. The ash was dissolved in hydrochloric acid and the calcium determined by precipitation as the oxalate followed by ignition and weighing of the resulting calcium oxide according to the method of the A.O.A.C. The calcium reported in Table II was obtained by calculation from the calcium oxide.

The phosphorus was determined in 5 gm. of the flour after ignition with magnesium nitrate solution, by the official A.O.A.C. molybdate method for the volumetric determination of phosphorus.

The calcium and phosphorus content of the fourteen samples of wheat flour, and their respective total ash content is shown in Table II.

TABLE II.

**Ash, Calcium and Phosphorus.**

**Mg. per 100 Gm. of Flour.**

| No. | Ash | Calcium | Phosphorus | Description |
|---|---|---|---|---|
| 9 | 370 | 18.1 | 109.7 | Patent, Soft Winter |
| 14 | 371 | 6.8 | 116.0 | Patent |
| 8 | 379 | 13.9 | 109.8 | Patent |
| 13 | 388 | 11.4 | 108.0 | Patent |
| 3 | 407 | 12.5 | 114.5 | Patent |
| 4 | 414 | 6.6 | 110.9 | Patent |
| 12 | 419 | 15.4 | 118.0 | Patent |
| 2 | 438 | 12.9 | 113.0 | Patent |
| 5 | 438 | 10.4 | 118.0 | Patent |
| 10 | 442 | 11.3 | 123.0 | Patent |
| 7 | 454 | 17.9 | 120.0 | Patent |
| 6 | 478 | 17.9 | 121.0 | Patent, Hard Winter |
| 11 | 818 | 21.4 | 198.0 | Clear |
| 1 | 1660 | 25.0 | 375.6 | Whole Wheat |

The amount of calcium found in the brands marked "Patent" does not show a constant relation to the amount of total ash. Flour No. 9 with a total ash of 370 mg. contained 18.1 mg. of calcium, which was the maximum figure for all of the patent flours. Flour No. 8 with a total ash of 379 mg. contained 13.9 mg. of calcium, which is higher than the calcium content of Flour No. 10 with a total ash of 442 mg. The phosphorus content of the patent flour does not show as marked a variation in relation to the amount of total ash as the calcium.

It is therefore obvious that the amount of both these elements which may be present in a patent flour cannot be satisfactorily predicted from the amount of total ash.

Since a commercial patent flour is the result of the combination of various mill streams of different calcium and phosphorus content it is not surprising that the amounts of these elements which may be present in an assembled flour show variations as indicated in Table II.

The twelve samples of commercial brands of patent flour varied from 6.6 mg. of calcium to 18.1 mg. per 100 gm. of flour, and the phosphorus from 108.0 mg. to 123.0 mg.

### REFERENCES

1. König, J. Chemische Zusammensetzung der menschlichen Nahrungs- und Genussmittel, Berlin, 1903.

2. Sherman, H. C. Chemistry of Food and Nutrition, N. Y., 1925.

3. Leach, A. E. Food Inspection and Analysis, N. Y., 1920.

4. Official and Tentative Methods of Analysis, Association of Official Agricultural Chemists, Washington, 1925.

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## *Dietitians Discard Food Fads*

"Any suitable material from Baking Technology will be always welcome, because at the Hospital Convention I got a lot of favorable comment from hospital dietitians on your articles. Several people expressed to me the opinion that you had given them a sane and sensible view on the nutritional value of bread and had exploded some of the faddy theories which have been so much in prevalence for the last couple of years."

Harry C. Phibbs, Managing Editor,
The Hospital Buyer.

## *Food, Nutrition and Health*

### A Book by McCollum and Simmonds

IT is quite impossible to bring the wonderful story of nutrition into a simple book without a full knowledge of the subject. Out of their years of research and with the experience gained by carrying the newer knowledge of nutrition to a larger popular audience than has been reached by any other authorities McCollum and Simmonds have brought together in twenty short chapters the basic truths of food and its utilization.

So much of the popular information about nutrition which loads down newspaper columns, finds space in magazine articles or is printed between book covers is utterly devoid of scientific fact or even of common sense that it is at least a hopeful sign of nutritional sanity when the leading workers in the field find a real demand for their latest publication.

McCollum and Simmonds have not attempted to write a new book. They have however, boiled down their great wealth of nutritional information into one hundred and forty pages and told in common and simple phrases the story of the vitamins which modern science is finding so necessary to health and nutrition.

"Even our common foods," the authors say, "have dietary properties which we knew nothing about until they were revealed by the newer methods of research." And until we understand better than now the relation between carbohydrates, fat, proteins, minerals and vitamins and the roles they play singly and in proper combinations we may wisely follow the teachings of the experts instead of the appeals of our appetites or the preachments of the ever changing crowd of self-appointed apostles of strange diets and weird eating habits.

The role of milk and of the leafy vegetables in furnishing the "protective" foods is constantly stressed and a larger use of these vitamin potent foods is urged as a supplement to the usual meat, bread and potato diet. Indeed throughout the book the sanity of its authors is shown by the way in which unwise food practices are corrected by the greater use of milk, fruits and vegetables instead of by the too common advice to adopt a new dietary regime.

The usual American diet may be inadequate in some respects but its deficiencies are readily supplied and McCollum and Simmonds find no reason for upsetting standard food habits. In discussing cereal foods it is pointed out that valid economic reasons compel the milling of white flour and while granting the fact that white flour is not equal in dietary properties to whole wheat flour the conclusion is reached that "it seems quite logical to advise the continued use of white flour."

One of the most valuable chapters is an elaboration of the wise old adage "let good digestion wait on appetite, and health on both." The reasons for pleasant company at mealtime, the effect of fear on digestion, the harmfulness of introspection and the wisdom of a wholesome attitude toward life are combined to effectively restore disturbed digestive systems to normal functioning.

In a discussion of over-weight and methods for reducing it is pointed out that as a nation we are consuming about a quarter of a pound of sugar per person a day and that this huge quantity of energy food is taken in addition to the actual energy needs of all save those at hard muscular labor. Sugar is evidently considered a "tempting" food which might well be used in less quantities.

The authors recognize the fact that nutritional information cannot be bought over the counter at the grocery store, nor picked up in casual conversation. It must come through sound education. And the teachers of the group which needs help are the physicians, dentists, nurses, home economic teachers and social workers.

If **Food, Nutrition and Health** could be placed on the table of all of these trained educators, and if they would study it as an introduction to the wonderful science of human nutrition, in the course of time the old and obsolete ideas of most of us would be brought up to date and we would bring to the professions of teaching and healing a sound understanding of food and its role in building vigorous childhood and in providing the energy for carrying on the work of the world.

The book sells for $1.50. It can be purchased from the authors at Baltimore, Maryland, or it will be forwarded postpaid upon receipt of the price by American Institute of Baking. It should be placed on the book shelves of every one who is interested in food. It might well be furnished to teachers by those who are concerned in spreading the gospel of sound nutritional doctrine.

## *Bakers on Parade*

PAGEANTS and civic parades seem to be another way in which the baker is attracting attention to his place in the public service. A dozen requests have come to the Trade Promotion Department within the last three months for information and suggestions about building and decorating parade floats.

No civic parade is complete without a good representation from the baking industry. The baker is an essential factor in the health of every community and an attractively decorated car, truck, or float has proven to be good advertising.

Next spring a larger demand for service in this line is expected.

—L. A. R.

# Educating the Consumer*

By Dr. H. E. Barnard

MOST of us are familiar with that part of the story of "Through the Looking Glass" in which Alice of Wonderland fame is asked by the Queen if she would like some jam. "No," said Alice, and the Queen replied, "You couldn't have it if you did want it. The rule is jam tomorrow and jam yesterday but never jam today." "Surely," said Alice, "it must come sometime to jam today."

It seems to me that when Lewis Carroll was writing his fairy stories for children Alice's looking glass reflected many definite pictures of human conduct and ambitions and opportunities. Certainly, we should seriously ponder over the discussion of when there will be jam in which Alice and the Queen indulged,—"It must come sometime to jam today."

I take it that it is the purpose of your Association to make Alice's optimism a reality. It is all very well to remember yesterday when there was plenty of jam, to recall the days of the war when jams of every description were an essential article of the soldier's diet, and it is necessary to look forward to the days to come when there will again be plenty of jam for children and adults alike, but after all, what we want now is jam today.

### *How to Increase Jam Eating*

How can the consumption of jams and preserves and all the rich and nutritious products you manufacture be increased? What reason is there for expecting a larger use of these products? How can they be added to a dietary which is already filled with excellent foods and which is perhaps the best ration any people in any time of the world's history have ever had spread before them. The consumption of preserves must be built upon something more than brand advertising. No matter what stimulus may be given to a particular product, in the long run the consumption of jellies, jams and preserves will be determined by the basic need for them. And so our first problem is to determine what that basic need is and why it cannot readily be met in some other way and how it may best be satisfied. There are several reasons for eating these products. Some of them are definite. Others are not so clearly defined. It is probable that the first and most important reason lies in the high sugar content. Sugar is our best energy food and most quickly fills the body's nutritional need. But there is much more in preserves than the sugar either of the fruit or as it is added in the form of beet or cane or corn sugar.

Preserves made from fruits offer the consumer all the high qualities of fruits in an acceptable form. They carry the flavor and the fragrance and the freshness of the fruits in the summer season past the harvest time into wintry days. And the fruit acids and mineral salts and vitamins are preserved in a delectable way. The call of the jam pot which drags Johnny into the pantry is a definite urge to which every normal child has listened and he has disobeyed no law of Mother Nature in meeting the call even when mother-made rules were violated.

### *Psychology Governs Appetite*

I wish it were possible to translate into some definite form all the subtle psychology hidden in the jam pot. We should immediately experience a much larger consumption of these products. Children who want jam are not easily persuaded that they do not want it for the need is too definite to be satisfied with a substitute.

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* An address given at the Seventh Annual Convention of the National Preservers Association at Louisville, Ky., Jan. 25, 1926.

In the old days when a normal ration was understood to be well balanced quantities of fats, proteins and carbohydrates it was a simple matter to secure the food essentials. All the carbohydrates had about the same fuel value, proteins were proteins and all fats were equally good. There is a newer knowledge of nutrition today and we have learned that there are many different kinds of proteins, that mineral salts are as necessary in the diet as fats and carbohydrates, that Vitamins A, B, and C and perhaps others of alphabetical terminology are needed just as definitely as sugar and starches. And so in arranging a diet which will fully satisfy every nutritional need of child and adult, we must bring to the table a far wider range of food materials than we thought necessary even ten years ago, and that is why these fine products of fruits are an essential part of the diet.

The important thing then is to provide the means by which they can be introduced into the meal and this is where the education of the consumer must begin. We know that every one likes preserved fruits. We have a more definite explanation for that liking than formerly, but we still have to find a way in which preserves may be used in larger quantities at the American table. When does the jam pot or jelly tumbler come to the table? Does it make its appearance at the morning meal or at noon lunch? How can the fondness of our English brethren for tea and toast and jam in the afternoon be cultivated in this country? I do not find the answer so difficult.

### But Few Basic Food Industries

We have many food industries. But few, however, are basic industries. Among the basic food industries are those which prepare milk for use in the form of butter or cheese, ice cream or bottled milk. The meat industry is a basic industry and so is the baking industry.

Just how does your product fit into a diet which must include milk and meat and bread? It is obvious that milk and jam is not a desirable combination, and the amount of jelly which is eaten with meats is unimportant. Many of us have learned to love the combination of Roquefort cheese and Bar le Duc, or orange marmalade with hard crackers, but even that satisfying and nutritious arrangement is eaten but occasionally.

There remains then but one practical combination and that is bread and jam. You will say, of course, every one knows that jam is eaten with bread and that if it was not for bread there would be little use for jam, but does every one know that if crisp toast, buttered thick and spread with jam, were made the basis of our breakfasts instead of the soft, sloppy breakfast foods which somehow or other, chiefly because of their easy preparation, have found their way to the table, we would have a more nutritious breakfast, a more delightful breakfast and a breakfast in which your products and the baker's products and butter from the creamery would fill a much larger place?

### Jam Sandwiches for Lunch

Every year a larger percentage of our population lunches downtown. What do you eat for lunch? What do the millions of office workers eat for lunch,—a glass of milk, an apple, a sandwich. The milk is essential, fruit is helpful and the sandwich furnishes the calories. Within the last three years toasted sandwiches have become as popular at lunch time as crisp bacon for breakfast. What percentage of the toasted sandwiches are served with jelly and jam? How definite has been your attempt to supply the need for fruit for luncheon with your concentrated products?

The opportunity of using more and more jam at lunch time is even greater than in the morning, but there still remains a definite place for the introduction of much larger quantities of jellies and jam into the diet, and that place is in the after-school sandwich. As a people we are committed to a three meal a day program. Our children have been taught that it is not well for them to eat between meals. Nearly every book which discusses the diet of children repeats the hackneyed and illogical advice, "Do not feed children between meals for it ruins their appetites."

### *Little Children Need More Food*

Of all the queer notions about diet and eating, this is one of the most fallacious. Children are hungry animals. They need a great deal of food, far more than most parents realize. Recent work carried on at the University of Chicago and not yet published, has shown that little children of kindergarten age require nearly as much food as adults at light work. They need energy food for their intensely active bodies lose heat rapidly and must be kept warm. They need muscle building food that they may grow normally. They need bone and tooth building food and above all, they need foods which contain vitamins to activate the glands and sustain every body function. It is safe to say that more children start for school in the morning underfed than well fed. The general practise of giving children a glass of milk at morning recess has done much to fill this need for nourishment. Too often the noon luncheon is inadequate and unbalanced, and yet our eating practices require that the child shall have nothing between the noon lunch and supper or dinner at 6:00 o'clock or later in the evening. Is it fair to the child who after confinement in the school room for most of the day, rushes out to vigorous play during the remaining hours to have to do so without energizing and sustaining food? Is it any wonder that candy shops are thick about school houses and that the virtues of chocolate bars are understood by every school boy?

### *The Fourth Meal Campaign*

At American Institute of Baking we are advocating the addition of a fourth meal to our dietary and the slogan, "A Fourth Meal at Four" is sweeping across the country. That slogan originated in California with a large milling company who wished to help their baker customers to increase the consumption of bread. It has been remarkably successful for two reasons. There was a real need for it and the campaign was well organized. Every child on the Pacific Coast knows that after school he has a right to go into his mother's kitchen and ask for a slice of bread and butter or bread and jam. Every street car on the Coast is picturing the Fourth Meal at Four for the education of mothers and of children alike, and into those pictures comes the story of jam as an ideal spread, as an energizing food, as a wholesome and appetizing and delicious food. With your help the Fourth Meal at Four will be assured to our children and they will be the better fed because of it.

You have noticed that in educating the consumer to the use of more jam and preserves bread has been the medium by which your products are consumed. It seems to me that our problem is something more than mere co-operation. We have a common purpose in increasing the consumption of bread and jam and we have a common opportunity to work together to make Alice's dream come true and have jam today.

## *Business Bulletins and Bakers' Conferences*

BUSINESS services and agencies are publishing monthly reports on all kinds of industrial and business conditions which are to the business man what the weather forecasts are to the farmer or the section conferences to the baker. Take the last La Salle Bulletin for example and note the outstanding facts about each industry.

Conservative buying is the general rule, because productive capacity and distribution facilities can meet all demands promptly. No change is looked for since employees in all lines have a general sense of security for the present and a lack of concern for the future.

The most important characteristic of industry has to do with production. In every single line more efficient methods and reduced costs of production have been worked out.

In 1925 the domestic production of gasoline was 22 per cent greater than in 1924 but more efficient and more scientific methods of production actually saved on the percentage of crude oil required. Likewise in the baking industry some companies are known to have maintained steady production with decreased costs of from five to twenty-five thousands of dollars per month, by more efficient shop arrangement and improved production methods.

The greatest experiment in balancing production and distribution against market demand is that of the farmers in eleven thousand agricultural co-operative societies in this country. The possibilities of improving the farmer's markets is forecast by the potato crop last year, which was twenty-five per cent smaller than in 1924 but which brought two and one-half times more revenue to the grower.

Should the predicted shortage of hard spring wheats bring about more production per acre with restricted acreage and higher price, the growth of farmer's co-operatives may some day have a profound influence on the baking industry.

Better co-operation in other lines is also the rule. The automobile industry may prove to be an interesting example. With the long predicted saturation point for pleasure and business cars apparently as far away as ever, the policy of this optimistic industry in co-ordinating supply to demand seems to be that of increasing demand instead of reducing production.

The joining of smaller companies into larger corporations had the effect of stabilizing the whole market and standardizing the consumer confidence in the reliability of the whole line. While the transition period made a more efficient production at lower cost a mandatory policy some incompetent manufactures were hard hit until they were forced to increased efficiency or went out of business.

But just at that stage the national association of that industry stepped into service which made it possible for the independent manufacturers to enjoy a steadier profit in a stabilized market.

Dr. Alsberg's excellent study of the trend in combinations within the baking industry points a possible parallel, in which the independent baker has an equal advantage with the larger groups.

Five extremely important opportunities for acquiring new information and improvement of methods at American Institute of Baking have just passed.

The House to House bakers; the Cake bakers; Pie bakers; the Home Service workers, and the Trade Promotion conferences sent over two hundred bakers back to their plants better equipped to maintain a stable production at a lower cost and to fit their sales and distribution into the need for an increased consumption program. The Society of Bakery Engineers with probably four hundred bakery production men meeting in Chicago from March 15th to 18th will be the greatest single influence this year for stabilizing the industry. The baker who sits through these conferences, contributing his bit of experience and taking away with him the best from all the rest is like the steel manufacturer or banker who studies the monthly business reports from other industries. He will understand the trends of his local market and not be stampeded by the business mistakes of his competitors.

—L. A. R.

## *A Scientific Staff of Life*

IF anyone has become possessed of the notion that science deals principally with problems that are abstract and secondary, he might get rid of this delusion by spending an hour in a great metropolitan bakery. We call bread our staff of life, and some of the most notable achievements of our food chemists have taken place in the manufacture of this most essential product. We talk of what mother used to bake. But her cakes and cookies never excelled in purity or equaled in cleanliness the products of the scientific, sanitary, sunlit bakeshop of the present day.

The housewife has small knowledge of nutrition and no facilities for experimentation. It took a real chemist to complete recent experiments which disclosed that even whole-wheat bread is deficient. The investigations of the bakers developed the fact that the solution of the problem was to make bread with milk instead of water. Also, in order to produce a bread that humans might live on as a sole source of food, it was found necessary to restore to the white flour the vitamins and mineral salts that were thrown away in the by-products obtained from milling wheat. Today in many places it is possible to buy a loaf of baker's bread that is a balanced food, complete in itself.

And as for cleanliness, even the air that enters into the modern baking process is filtered, washed and cooled. Each week a bucket of mud, washed out of the air that goes into one great bakery, is taken from the atomizer. Human hands never touch the products and no one guesses at temperatures in the different rooms or in the ovens. So precise are the demands of the baking processes that ordinary thermometers were found to lack the needed accuracy, so that special instruments had to be devised. To say that the food chemist is a serious threat to the supremacy of home cooking is to state the case with much conservatism. We may regret the change, but at least it represents a tremendous conservation of human energy.

—Floyd W. Parsons.

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## *The Restaurateur's Viewpoint*

Restaurant operators look upon bread as a commodity to sell and they must be interested in it on some three or four accounts. First the possibility of increasing volume business at a profit, and of course this can only be done when bread is sold for a price and not given with the meal; second—some means of making bread productive as a food in some other form than when served in the usual fashion; third—the possibility of making bread a feature that might attract repeat business. Restaurant operators are becoming increasingly interested in sweet rolls and hot breads.

—T. T. Frankenberg.

# Books for the Baking Laboratory

COMBINATION IN THE AMERICAN BREAD-BAKING INDUSTRY, with Some Observations on the Mergers of 1924-25. C. L. Alsberg. January 1926. 148 pp. Cloth, $2.00; paper, $1.50. Food Research Institute, Stanford University, California.

This study of recent developments in the baking industry is an effort to analyze the causes leading up to the consolidations of independent companies into chains of bakeries stretching across the country and to determine the effect on the public welfare. No attempt is made to present a historical record of the expanding industry. Rather the author writes of combinations and discusses the outlook for their success, their effect on the public and their value to the investor while the process of forming and merging wide spread interests is still going on, in the hope that his study may help to mould public opinion.

No one is better fitted for this interesting and audacious task than Dr. Alsberg. He brings to his work a broad knowledge of the food industries, and their service to the public and he approaches his difficult task with no prejudices and with the single purpose of determining and interpreting the facts as he finds them.

The growth of the combinations is traced through the years since sharp competition and questionable trade practices forced the first consolidations more than a quarter of a century ago, up to the recent evolution which started in 1922 when the first holding corporation was formed, and which the author now pictures in the form of three large combinations, several other smaller combinations, a great many large retail and wholesale bakers and an increasing number of chain store bakeries.

In discussing the outlook for expansion the author points out that home baking will not be supplanted by commercial bread baking for several decades and that an increasing population will bring more new business to the baker that that given over to him by the housewife.

The advantages of mass production in large plants and of centralized management are skilfully weighed and the conclusion reached that the economies possible in other merged industries will not obtain in the bakery field because centralized production is impractical in the case of a product which must be manufactured and distributed daily to customers within a relatively short distance of the plant.

Dr. Alsberg gives due consideration to the possibility of a monopolistic control of the bread industry and finds no reason for fear that the public will suffer because of increased bread prices. He relates the ease with which a baker with limited capital can compete with a large corporation and points out the fact that when bakers are forced out of business through inefficiency others will be ready to step into their shoes with prospects of success.

In discussing the outlook for success the author concludes that because of the low average efficiency of the industry as a whole the bakery combinations will be successful for a time, but that as efficiency rises the initial advantages of group operation will disappear. A significant statement of the writer is that "the ultimate fate of the baking industry lies in the hands of the independent baker and not in those of the small retailers or the great combinations."

An interesting chapter discusses the effect centralized buying will have on the flour milling industry and predicts a hastening of the process of scrapping obsolete and uneconomic mills and a shunting out of flour brokers and jobbers. It also points out possible advantages to the farmer through the use of weaker flours by efficiently operated chains with a resultant diversification of farming in the hard wheat areas. The relations of the public to the combinations are carefully analyzed and the author concludes that "there is likely to be sharpened competition, which, by eliminating high-cost producers, may result in the reduction of average bread prices. The author hopefully points out the possibilities of substantial advancement of technological research. In discussing the labor problem at the bakery the conclusion, is reached that "with monopoly unlikely and concentration of production impossible no notable advantage in dealing with labor seems likely to come through consolidation."

Dr. Alsberg concludes his critical essay with the sage observation that it will satisfy neither those who disbelieve in the merging of great food interests nor those who would find broad economic advantages in such consolidations. The reader is furnished with a comprehensive survey of the conditions which have led up to the amazing developments of the last few years and allowed to draw his own conclusions as to the probable effect they will have on economic and social history. No wiser course could have been chosen.

H. E. B.

# *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**The necessity for legislative control in the sale of milk breads.** R. M. Allen. U. S. Dept. Agr., Dairy Div., World's Dairy Cong. Proc. 2, 1315-7 (1923); Expt. Sta. Record 52, 505-6.—A tentative method for the determination of the milk content of bread is given. This includes the determination of lactose and of fat. For the former, 50-60 grams of fresh or air-dried bread are digested in distilled water at about 40° for 1 hour, and the extract is separated by adding 20 grams of Filter-Cel, centrifuging twice, and finally filtering through a Buchner funnel containing Filter-Cel. To the extract are added 35 grams of starch-free yeast and, after warming to 80° F., 0.5 grams of $(NH_4)_2SO_4$. The mixture is aerated by means of compressed air for at least 2 hours, made up to 1,000 cc. and filtered, and the filtrate used for the determination of lactose by the gravimetric Cu reduction method. For the determination of fat, 200-300 grams of finely ground air-dried bread is digested by boiling for about 1 hour with 1,000 cc. of distilled water and 30 cc. of HCl. The mash is then filtered through a Buchner funnel after the addition of 10 grams of Filter-Cel. The residue is stirred with ether and filtered through Filter-Cel into a dry flask. After evaporating the ether the oil is used for determining the Reichert-Meissl number. H. G.

**Report on (the determination of) chlorine in bleached flour.** Armin Seidenberg. J. Assoc. Official Agr. Chem. 8, 676-8 (1925).—The chlorine in bleached flour is commonly thought to be found in or with the fat. The following modification of Hartwig's neutral extraction methods for lipoids (C. A. 17, 3,386) was found to give the most complete extraction without formation of emulsions: to 10 grams of flour in a 500-cc. Erlenmeyer flask add 30 cc. of 70% alcohol, warm very slightly till the flour is evenly distributed throughout the liquid, add 30 cc. of 95% alcohol, shake thoroughly for 2 minutes, add 100 cc. of petrolic ether (b. 30-75°), shake, transfer to a separating funnel, wash the contents of the flask with 2 25-cc. portions of petrolic ether and transfer to the separating funnel, add 30 cc. of water in the funnel, shake, draw off the lower layer, wash (if necessary) and evaporate the petrolic ether at low temperature after addition of 5 cc. of 4% alcoholic KOH.

A. Papineau-Couture.

**Comparative nutritional value of white and whole wheat flour.** C. U. Moore and Jessie L. Brodie. Arch. Pediatrics 42, 572-7 (1925).—When white mice were fed properly balanced, chemically identical diets, the gain in body weight, was 4 times as great on whole wheat flour as on white flour. The consumption of food was twice as great on the whole wheat flour ration as on the white flour ration. The mice receiving white flour frequently developed paralysis and some died; their fur became clumped and abnormally oily; and they had a decreased resistance to cold weather. When they were transferred to the whole wheat flour ration, they rapidly regained body weight; and their fur became normal. The white flour is deficient in vitamin B. From the viewpoint of nutrition, (cost of food per unit gain in body weight) whole wheat flour is far superior to white flour. A bibliography is appended.

Joseph S. Hepburn.

**Report on (the determination of moisture in) wheat flour.** G. C. Spencer. J. Assoc. Official Agr. Chem. 8, 667-70 (1925): cf. C. A. 19, 1315.—Two methods are recommended: a standard or referee method consisting in drying 2 grams to constant weight (about 5 hours) at 98-100° at an absolute pressure of not over 25 mm.; and a routine method consisting in heating 2 grams for 1 hour at 130° at atmospheric pressure. Collaborative work showed that the 2 methods give concordant results.

A. Papineau-Couture.

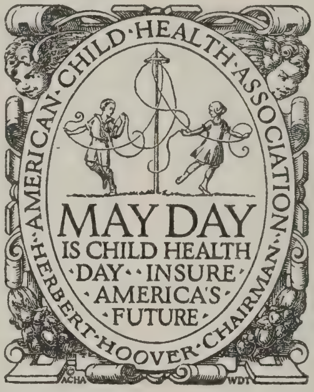
**Report on sampling of flour.** G. J. Morton. J. Assoc. Official Agr. Chem. 8, 680-6 (1925).—From the results of experimental work which is described, Morton recommends the following method of sampling: draw by means of a suitable trier inserted with light pressure and slow rotation through the middle of the top of the sack (placed in a horizontal position) a core of uniform diameter and from a depth approximately equal to the distance from the edge to the center of the sack; sample at least 10 sacks from 100, 15 from 300, 20 from 600, 30 from 1,000; place the composite sample immediately in air-tight containers without mixing; prepare the sample by passing the flour 3 times through a domestic flour sifter, no further mixing being necessary. The trier devised for this purpose is made of heavy sheet Cu, and measures 12 in. long by 1 inch in diameter at the forward end and 1.75 inches at the rear end, and bears marks indicating the different depths.

A. Papineau-Couture.

# May Day and Child Health

*Our Children Are Our Finest National Assets*

WE have come at last to that highest and most fundamental economy, the conservation of our children. Ellen Key, the great Swedish writer and philosopher, at the opening of the twentieth century christened it "the century of the child." The first quarter of this century has rounded to a close, and, pausing to reckon its achievements, nothing stands forth more conspicuously than the changes it has brought in the lives and prospects of children, the efforts which have been inaugurated looking toward the conserving of child life and happiness, the changed attitude towards the child.



These efforts are numbered by millions. Every mother wishes perfect health for her children. Every teacher knows that the education of the unfit is wasted labor, and that the success of her work in the school room depends quite as much on the breakfast of her students as on class work and blackboard exercises. Every study of child nutrition confirms the belief that the 30 or 40 percent of the school population which is malnourished and physically below normal is due in very great degree to inadequate and improper feeding.

Back of the mothers in the home and the teachers in the school lies the organized effort of hundreds of societies which are working for the welfare of our children.

This organized effort has become more fruitful in recent years since the American Child Health Association established its intelligent leadership. The work of saving babies and protecting them in their adolescent years has culminated for the past two years with a May Day Celebration. Since its organization this has been the peak day in the Association's year-long work for happy childhood. The May Day which is but little more than a month ahead will be the third nation-wide effort to focus general attention on the right of children to a heritage of health and happiness.

No industry is more interested in children than the baker's. His products provide a large part of the energy for active, well nourished and happy children. The baker's responsibility to the children is great and his appreciation of that responsibility measures his right to leadership among the servants of mankind.

No more efficient service has ever been rendered than that of the National Dairy Council which for many years has been urging a larger use of milk and butter in the feeding of children. And now for the first time the dairy industry, the great meat industries, the bakers of bread and all the agencies which produce and distribute the food supply, are working together on a common program which will insure the children of today and of the years ahead against the inefficiency incident to malnutrition and unbalanced and improper diets.

The bakers who join hands with all of the agencies working for the May Day program are helping to hold up the hands of those who are trying to make this old world easier to enter and happier to live in.

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# Sixteen Sound Suggestions

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ADVICE is easy to give but hard to turn into definite results. It is often undesired and frequently looked at with suspicion. And yet every service club which gathers weekly for its luncheon program and every conference which meets around the table is but the working out of the natural law which draws men together for mutual inspiration and pooled opinions.

The first group of bakers met because its members were seeking advice. The constitution of every association has a section defining its purpose as the betterment of its members. And the strength of the organization is a measure of the ability of its members to give and take advice, to throw off the spirit of intolerance and to work with each other for the common good.

The efforts of American Institute of Baking to lift the baking industry to a higher plane of service are materially retarded by the fact that the number of men, whether they are bakers or bankers, who will thoughtfully listen to the suggestions of others is but a small part of the entire group. The men who do listen, who are willing to take advice and then to test out its soundness, establish leadership which pushes past obstacles and gains its objectives.

The objective of the baking industry is plain. It is, of course the increased use of baked cereal foods. And every effort of miller and baker to stimulate the use of special brands of flour or bread, and every improved formula or better product, is a definite step toward the desired goal. The motives of the baker who seeks a larger business may at close view seem wholly selfish, but in the long run his success in gaining and holding an outstanding position among his competitors will be determined by the character of his service.

In an effort to analyze the ways by which the service of the baker to his customers may be improved and the use of bakery products increased, American Institute of Baking has formulated a number of suggestions. The advice may be too obvious to be worthy of consideration, its logic may be faulty, or its methods impractical. But when the advice has been tried out, and not until then, the Institute will learn whether its ideas are futile or beneficial. And the baker on the other hand, who gives no thought to some of the suggestions as they may fit his own business, is in the position of the farmer who plants no corn in the spring because of his fear that crows and cut worms, summer droughts and fall rains will deny him a crop at harvest time.

Sixteen practical methods of increasing the consumption of baked products are set out by the Institute. They are for the most part self-explanatory. In some details they overlap but each suggestion is complete in itself and needs only a thorough tryout to prove its value. If any method proposed for increasing the use of bread or pie or cake is economically or nutritionally unsound, the sooner the baker discovers that fact the better it will be for his industry and for society as a whole. Conversely, those projects which if properly executed will contribute to the general welfare, should be given every support.

The sixteen suggestions are listed below with such explanations as may seem to show the advantages of the idea or how they may be carried out in commercial practice:

*1. Increase the weight of the unit bread sale to 1½-lb. loaf.*

While the baker is still varying the size of his loaf according to the flour market and prevailing price condition it is obvious that a standardized loaf size in a unit weight which will not make its purchase too costly, will increase the pounds of bread sold and at the same time stimulate a larger per capita use. The panning of bread in twin or other forms easily divided by the sales clerk tends to reduce the size of the unit sale. Since no food is better adapted for large use than bread, and since, pound for pound, it is the cheapest of all foods, there can be no economic nor nutritional objection to the elimination of all units weighing less than one and one-half pounds, the loaf size which is best adapted for slicing and serving and which can be baked and handled most economically.

*2. Improve bread quality by making a more compact loaf, of finer grain and texture, thereby reducing oversize and producing a loaf—*

a. easier to cut without crumbling.
b. slower in staling.
c. easier to butter.
d. better for toasting.
e. better for sandwiches.
f. with improved flavor.

Every bake shop practice which will improve bread quality will stimulate the increased use of bread. The suggestions as to the means to this end will stimulate the efforts of all generations of bakers to come. The perfect loaf will never be made but the indifferent bread of today, improved as it is over the bread of yesterday, will be much better five years from now.

*3. Increase the use of milk to meet requirements for the most healthful food.*

There may have been some question in some minds as to the desirability of adding milk to bread doughs. There is no doubt today as to both the desirability of milk and its absolute necessity in bread formulas. The strongest argument for the increased use of bread is that it is our best food. Bread made after the European fashion, without milk, sugar or shortening, is a high energy food, but it is not an adequate food nutritionally and must be supplemented by other foods if it is to serve its great purpose in building stronger children and energizing the work of the world. Skim-milk solids are as natural and necessary a part of bread as the flour itself. When every loaf of baker's bread contains a full complement of skimmed milk and when eaten with the butter fat taken from the milk in its commercial preparation for storage and sale, it will be as sound nutritional practice to say to every mother, "See to it that your child has a pound of bread a day" as it now is to stress the fact that a quart of milk is necessary for adequate child feeding.

*4. Baked goods are the ideal breakfast.*

a. replace cereals with toast by toast campaigns.

b. sweet rolls and retail specialties by local advertising.

The time to begin to increase the use of baked products is when the family comes to the breakfast table. Breakfast should be a sustaining meal. After a night's rest the stomach is empty. It craves food. It needs substantial food from which to build health and vigor in children and energy for the work of the day. No food so fully meets these requirements as bread, toasted, buttered, eaten with milk by children hurrying to start for school, with jam or sweets for adults who need large calory diets, with fruit juices for vitamins and flavor and crisp bacon and an occasional egg for strong proteins. No finer slogan for health was ever sounded than "Make Toast Your Breakfast Food."

*5. Popularize the mid-morning lunch for both school and home.*

There can be no question as to the necessity for a mid-morning lunch for growing children. The splendid results which have followed the adoption of giving school children, as a general practice, a half pint of milk with bread or crackers at the morning recess, should make all argument as to the desirability of between meal feeding unnecessary. If the child at school learns more easily and is better nourished because of a ten o'clock lunch, every child at home should have the same opportunity for adequate nourishment.

*6. Make baked products the leading luncheon foods.*

Millions of office workers "carry on" the last half of their day with the energy obtained from a noon lunch. Millions of workmen who are converting raw material into roads and bridges, homes and office buildings, still carry a dinner pail to work.

The noon lunch is a most important meal. It must be substantial and it must also be well balanced. No food is richer in energy or better adopted for the midday meal than generous portions of bread and butter, bread and jam, bread and meat sandwiches eaten with fruit and milk and topped off with cake or pie.

The baker is too prone to think that the use of his products is determined by subconscious appetite appeals. An intelligent stressing of the value of bread and pie and cake in energizing the work of the world will greatly increase the consumption of his products.

*7. Establish the afternoon lunch for children.*

If children are benefited by a recess feeding of bread and milk, they will use an after-school lunch quite as advantageously. The old taboo which made it a crime for children to be hungry between meals is rapidly being forgotten. Children need food whenever they are hungry and there is always a hunger call in the mid-afternoon which should be answered by bread, thickly spread with butter or jam and eaten with fruit or a glass of milk.

*8. Make the European habit of tea and toast at 4:00 an American custom.*

American business operates at a high pitch of efficiency, but the tension of long morning and afternoon hours at the desk or bench may well be relieved by the introduction of the European custom which slows down the wheels of industry at 4:00 o'clock for a service of tea and toast. The tea interests of the world are already developing plans for foisting the 4:00 o'clock tea habit on our people. There are many logical reasons why we should adopt their ideas. From the baker's point of view the most important reason is the opportunity it will provide for increasing the use of toast and cake. The baking industry may well study the possibilities of co-operating in all such campaigns.

*9. Baker's products should be the economic foundation of the evening meal.*

It little matters now whether the evening meal is dinner or supper. It is the most important meal of the day. The whole family usually gathers around the dinner table at the close of the day's work. Dinner is the heavy meal of the day, often it is too heavy. It would be better balanced, more easily digested and more economically served if it consisted of larger quantities of baker's products.

Bread in its every form should furnish most of the energy material of the evening meal. Toast may be used as a serviette for meats and creamed dishes and as a garniture for other foods wherever possible. And at the close of the meal when desserts are expected, pastries, pies and cakes may well be substituted for the more concentrated sweets. The larger use of the products of flour at the evening meal is justified by the digestibility, palatability and low cost of baked goods.

(To be continued)

## Romance in a Loaf of Bread

SINCE the beginning of time the loaf of bread has been considered the staff upon which men depended for support and sustenance. So vital has it been found throughout the centuries that even in prehistoric days skill in bread making was at its height—in a crude sense—for loaves of it are found to this day perfectly preserved through countless years by scientists hunting down clues as to the lives and habits of our forebears.

The Mosaic Law placed such importance upon bread and the necessity of preparing it, that the ordinary man might live, that it was forbidden to accept a millstone in payment of a debt, lest the debtor be figuratively deprived of his daily bread thereby. Our modern laws are more specifically concerned with the weight, the food value, the cleanliness, the perfection of manufacture of our present day baker's loaf, but nevertheless keeps a close watch over its making.

From Biblical allusions, we gather that fine definitions were made between the bread of the high-born family and the bread of the workingman and the slave. In these democratic days the most humble of households may rejoice in bread par excellence, not to be outdone by any on a prince's table.

Now marvellous inventions in grinding

and baking machinery have replaced the wearisome old methods which were always part of the household work, and the modern bakery has stepped in to relieve the home-maker of one more arduous and unending task, providing her with a uniformly perfect product which she may buy in the size best suited to her family's needs, without hours of mixing, raising and baking, week in and week out.

### *Wonders of Modern Baking*

In our present-day bakeries, flooded with sunlight, equipped with wondrous machines, manned by trained workers, superintended by experts, all under the eye of the law, the preparation of thousands of loaves of bread becomes a story of mechanical romance. Science enters the bakery and inspects and improves the blends and brands of flour, sugar, shortening and yeast as no housewife could hope to do. Faultless mechanical mixers time after time obtain just the perfect combination of ingredients. Technical experiments without number show at last the perfect combination and treatment which will provide dependable, desirable bread every day of the year.

A problem for a master mind presents itself when we consider the preparation of a loaf which will always bear the earmarks of freshness and purity—always be just right for immediate consumption, always "taste like more," always appeal to the discriminating purchaser as having been prepared with scrupulous care. Again science adjusts its spectacles and labors during the night watches, with the result that perfection is found and secured and our bread comes to us without being touched by human hands, and comes in the height of its toothsome palatability.

Winifred Stuart Gibbs
in N. Y. Telegram.

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He who has no bread has no authority.
—Turkish Proverb.

## *Whole Wheat and Graham Breads*

The health columns of papers and magazines are a power for good—and evil. Fortunately they are more intelligently edited than formerly and their advice is sound and helpful.

The editor of the health column of Hygeia in the April number ably answers a seeker for nutritional truth about whole wheat and graham breads. The discussion is reprinted, not in support of any theory of the baker that whole wheat foods are not excellent foods for those who like them but because it does point out the danger of using the coarse breads except under intelligent medical supervision.

---

To the Editor:—Is whole wheat or graham bread essential at every meal for men and women students, if vegetables and fruit occur frequently in the diet?

A. E. S., Iowa.

Answer:—Whole wheat and graham bread are valuable constituents of a diet for fuel, minerals, bulk and vitamins. No food is essential whose constituents can be provided by other food.

A day's menu that contains, among other things, two servings of fruit, three servings of vegetables, and a pint of milk will be quite adequate in its mineral and vitamin content, without the addition of coarse breads. It will supply also the requisite bulk for intestinal activity.

Some observers have noticed that when too much roughage or too coarse foods are taken over a long period of time, an increasing amount of bulky foods is required to bring about a daily bowel movement. The person may begin to complain also of gas and abdominal distress. The constant use of such foods in a diet will set up a spastic condition in the intestines that is just as truly due to irritation as if it had been produced by cathartics. Therefore, whole wheat, graham bread and like foods may be actually injurious if used to excess.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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APRIL 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *What Makes a Man?*

*HEREDITY?* That gives the credit to ancestry.

*ASSOCIATES?* They can be helpful but a man does not develop by leaning on others.

*CLOTHING?* The first business man to adopt the saying—"*Clothes Make the Man*"—"started something." Manufacturers of suits, hats, neckties, shoes, etc., took up the slogan and have given it worldwide publicity. Even builders of homes and manufacturers of automobiles followed with like selling arguments.

Meanwhile the flour miller and the baker remained speechless. They were so close to mankind already that they saw no reason for stressing their importance but other manufacturers of foods took up the idea and with slogans such as—"Tell me what you eat and I will tell you what you are"—they sold and are selling hundreds of millions of dollars worth of prepared foods every year through their publicity and merchandising ability.

What makes a man? What he takes into his stomach has more to do with it than anything else. *Bread* was the staff of life that made this nation what it is today. It is the food that fed the founders of our Constitution. If the children of the nation have good bread, pure water, fresh air, we need have little fear for the future of our country.

*BREAD MAKES THE MAN.* It always has and always will. The child raised on good bread and plenty of it, is getting a good start in life.

During the War the bread fed to American soldiers was the wonder and envy of most of our Allies. Our Army was frequently referred to as "the best-fed Army in the World." The value of good wholesome bread should be emphasized in times of peace just as it was in a time of War. Surely good citizens are just as important as good soldiers.

L. J. Schumaker,
*President, American Bakers Association.*

# *Out of Focus*

WHEN the photographer finds it necessary to be kind to clients he knows how to throw the lens of his camera slightly out of focus, preserving the general spirit of feature and expression, but blurring over those tiny details of skin texture or telltale wrinkles which might detract from loveliness. When minute detail is required for the faithful reproduction of mechanical construction he makes full use of the scientific accuracy of his lens, and creates a photograph from which reproductions can be made.

Too many men in the baking business seem to be satisfied with a blurred mental picture of total volume instead of focusing their attention sharply on the cost facts of every operation, in production or distribution.

Deliberately throwing ones mind out of focus occasionally with the customer's daily needs in order to see what progress a competitor is making often stimulates our mental activity, but it is the detailed picture of the opportunities in the home market which will keep the bank balance growing.

L. A. R.

# Compete but Co-operate

YOUR greatest competitor is not the man who is in business across the street. You cannot see your greatest competitor but he is with you every business day—through all your working hours. He has his hand on every machine—he trails after every one of your salesmen—he is standing behind the counter when your goods are sold. He is the greatest exponent of unfair competition and restraint of trade. He is the demon Ignorance!

Ignorance is the cause of economic waste. Ignorance of the nature of business fluctuations is the cause of depressions. Ignorance of the facts of supply and demand is the cause of troubles which afflict the separate industries. Ignorance of efficient business methods is the cause of individual failure. In its earlier decisions on trade associations the Government set up ignorance as the dominating power in industry. It was almost sacred. It was almost a patriotic duty of business men to be ignorant—they were forbidden to eat of the fruit of the tree of knowledge.

But the ban is being lifted and the trade association can now go on with its great work of dispelling ignorance and eliminating waste.

The time is not far away when a business man's membership in trade associations will be an important factor in his banker's judgment of his credit rating. It will be that for three reasons: Trade association membership is a measure of character, because it shows the member's ability to get along well with others. Trade association membership is a measure of intelligence of the member's business methods, because he is trying to eliminate competive waste and to use co-operation as an economical promotion weapon. Trade association membership is a measure of the soundness of the industry, because it is doing something for the stability, efficiency and economy of production and distribution.

From an address by O. H. CHENEY,
*Vice-President, Am. Ex. Pacific Nat'l Bank, New York.*

"I shall be very happy to receive Baking Technology. My job is that of teaching children and anything that helps a child grow is of great interest to me."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of BAKING TECHNOLOGY, published monthly at Chicago, Ill., for April, 1926.

State of Illinois, } ss.
County of Cook, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared H. E. Barnard, who, having been duly sworn according to law, deposes and says that he is Editor of BAKING TECHNOLOGY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.

Editor, H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

2. That the owners are:

American Institute of Baking, a Corporation formed not for profit,
H. E. Barnard, Manager,
L. J. Schumaker, President, acting for American Bakers Association.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None.

H. E. BARNARD.

Sworn to and subscribed before me this 15th day of April, 1926.

(Seal) Rosabelle E. Priddat, Notary Public.
(My commission expires August 24, 1926.)

# Cake and Nutrition

## *The Ingredients Used in Cake Make it a Highly Nutritious Food*

By Roscoe H. Shaw,

***Chief, Department of Nutrition, American Institute of Baking***

WHILE pie, especially in its modern state of perfection, is purely an American dish, the same can not be said of its companion sweet, cake. The origin of cake is unknown. It is mentioned many times in the Bible, but the cake of Biblical days was not cake as we know it today. The name cake is derived from words which mean "to cook," so it is very likely that in ancient times many articles of food were called cake that would not fall into that category today.

The use of cake is worldwide and each country has its own special kinds of cake. In many countries the eating of cake is often connected with festive occasions and accompanied with some ceremony, but the inherent sweet tooth of the American people makes it probable that more cake is consumed per capita in this country than in any other.

Although it is true that in some families the baking of a cake is more or less of an event, it is coming to be more and more a part of our every day food. There is a good reason why cake should be a part of our daily diet for it is a very nutritious food.

### *Why Cakes are Nutritious*

While the ingredients used in cake making are somewhat varied, almost all cakes contain eggs which are excellent sources of high grade proteins, fats, mineral salts, and vitamins. All cakes contain sugar which is a pure carbohydrate and the best heat and energy food we have. Excepting for the variety typified by the sponge, practically all cakes contain shortening which is usually, in part at least, butter. Some cakes contain milk and of course they all contain flour. So in cakes we have the muscle-building part of food represented by the proteins of the eggs, milk, and flour; the heat and energy essentials by the fats of the shortening, eggs, and milk, and the carbohydrates of the sugar and flour. Vitamins are supplied by the eggs, the butter, and the milk. Food value is also added by the fillings, the value of which of course depends upon the ingredients employed. Fruits and nuts are frequently used in cake making, and these naturally add more valuable food constituents. Nuts are particularly good sources of proteins, and fruits carry vitamins and mineral salts.

In a study of cakes a short time ago the American Institute of Baking analyzed some typical cakes bought on the open market and they were found to contain about 1500 calories per pound or 25 per cent more than the average bread, due chiefly to their lower moisture content.

### *The Food Needs of the Child*

The subject of child feeding is receiving an unusual amount of attention today and older ideas of mothers and dietitians are changing. Children require food for three different purposes: for maintenance, for growth, and for work (for play to a child is work and often hard work). Adults, under normal conditions require food for only two purposes—maintenance and work. Recent investigations have shown that very young children frequently consume as much food, in terms of calories, in the course of the day, as does the average adult. The capacity of their stomachs is of course limited, therefore the mid-morning and the mid-afternoon lunch is being strongly advocated. The child needs a source of quick energy and heat, as is shown by his natural craving for sweets. Sweets should not be denied him and the question comes as to what form of sugar-containing food is best for him. Too high a concentration of sugar is not desirable. Although the child loves candy, this confection contains sugar in too highly concentrated form for frequent use. It has been shown that sugar in concentrated form eaten in excess acts as an irritant on the stomach. The concentration of sugar in cakes is not high—probably the range of 15 to 30 per cent will cover it. Properly made cakes of the plainer varieties are good components of a child's diet and will satisfy his longing for sweets.

The variety of cakes in this country is almost endless, but for the sake of a sort of arbitrary classification, we might place at the top the complicated fruit cake, reminiscent of Christmas cheer, and then go down the list to the one-egg cake or to the humble cake with no egg at all. The fruit cake is made up of citron, nuts, raisins, currants, etc., besides the customary ingredients of a good cake.

### *What are Rich Foods?*

It is the opinion of some dietitians that cakes, at least some kinds of cake, are too "rich" for children. The term "rich" is frequently applied to certain foods. Just what this term means is somewhat obscure. At a meeting of domestic science and nutrition workers held at the Institute of Baking some weeks ago, the question was asked "What is meant by richness in foods?" and no satisfactory answer was made. We had tried before in other ways to get some light on this vague expression, and with similar results. Webster gives two definitions of "rich" which may be applied to foods: the first, a general one, "Containing valuable or costly materials or ingredients"; the second, "Abounding in agreeable or nutritive qualities—especially applied to articles of food or drink which are highly seasoned or abound in oleaginous ingredients, or are sweet, luscious, or high-flavored; as a rich dish, rich cream or soup, rich pastry, rich wine or fruit." Applying these definitions to cakes the fruit cake heads the list, for some of its ingredients are the most expensive used in cake making and include a liberal amount of butter. The same line of reasoning would pronounce the simple no-egg cake with little shortening at the other end of the list, the least rich of all cakes. Between these two lie a great many varieties. Perhaps of the more common cakes the pound cake would run a close second to fruit cake under Webster's definitions of richness. The pound cake as its name indicates, is made in the proportions of a pound of butter, a pound of eggs, a pound of sugar, and a pound of flour. In this case butter is the expensive ingredient, and eggs come next.

When butter is a principal ingredient of cake it is also its most expensive one, so then in this sense, again using Webster's definitions, a cake may be rated as to its richness by the amount of butter or other shortening, used. The pound cake is more often eaten on special occasions and is not generally an article of every-day diets.

### *Fat in Cakes*

The chemist can tell us exactly how much fat a food contains. Not a great deal of chemical work has been done on cakes, but we do have some data on the subject. In Dr. Sherman's "Food Products" he gives us some analyses of cakes. Some work on cakes has also been done in the chemical laboratory of American Institute of Baking. Wm. C. Luckow, under the caption "Composition of Cakes" in the October, 1925, Baking Technology, gives the analyses of 5 of the common cakes found on the market. Mr. Luckow found these percentages of fat in the cakes studied:

| | |
|---|---|
| Gold cake | 9.43% |
| Sponge | 5.14% |
| Silver | 5.58% |
| Chocolate | 5.65% |
| Devil's food | 7.27% |

It will be noted that the highest percentage of fat in the cakes studied was in the gold cake where it was 9.43%. Would this be considered a rich cake? Does one consider a slice of bread and butter a rich food? Of course no one does and yet, as a matter of fact, the slice of bread and butter contains a much higher percentage of fat than does the richest cake of Mr. Luckow's list. A slice of bread and butter as usually eaten contains about 20 per cent of butter. Butter contains about 80 per cent fat. Therefore the fat which the butter adds to a slice of bread is about 16 per cent, to say nothing of the fat in the loaf itself. A slice of bread and butter then is almost twice as rich, still using Webster's definitions, as is the gold cake above mentioned.

A chemical analysis will not ordinarily show whether or not the fat came entirely or in part from butter, but from the nutritional standpoint, aside from the vitamin content it makes no difference, since all the fats used in cookery have about equal values and the ease and completeness of digestion varies but little. This includes all the common dietary fats such as butter, lard, hydrogenated vegetable oil, or compound.

### *Good Food for Children*

Barring the fruit cake which is a cake for special occasions, and eaten usually when it is the rule rather than the exception for gastronomic errors to be committed, the principal ingredients of cake are among the most nutritious and easily digested foods we have and each one is a recognized component of some universally recommended child's food.

It is not necessary nor perhaps even desirable that cakes be complete foods. No one would recommend living solely on a diet of cake. What a cake may lack in some essentials, is easily supplied by the other foods eaten with it. Some cakes, however, are more nearly complete foods than others, for example those cakes containing the whole egg are better foods than those made with the whites alone. Some cakes contain milk which adds very much to their nutritional value. Cakes, especially those made from eggs, sugar, flour, and shortening only, are low in lime, hence the desirability of combining a slice of cake with a glass of milk in the child's lunch.

For children frosted cakes are less desirable than plain ones, even though the total percentage of sugar is no higher, because of the tendency of some children to eat the frosting off the top and discard the rest. Therefore "sugar in the cake rather than on the cake." This holds equally true with breakfast cereals—the sugar should be mixed with the cereal rather than sprinkled over the top, so that the child gets the sugar uniformly distributed and can make no selection.

### *Children's Lunches*

The older practices of allowing the child to go without food from breakfast time until the noonday meal, and again from the noonday meal until the evening meal, is fast giving way to the mid-morning and mid-afternoon lunch. Aside from other requirements, the child needs more quick energy foods in proportion to his weight than does the adult. Sugar in low concentration is the best source of this, and what food could be better adapted to the purpose, or what food would prove more acceptable to the child than a prop-

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erly cooked simple cake made of high grade materials? There are children who do not have hearty appetites. What could be more tempting to their fickle appetites than a slice of such cake accompanied perhaps by a glass of milk or some fruit?

Cake is an economical food for both children and adults. Every crumb can be used. It does not stale rapidly and some can always be kept on hand. Even if it be kept so long that it has become hard and less tempting, it can be made a part of delicious desserts such as cottage puddings, etc. When too dry for this it can still be ground up and used as a basis for other cakes, such as the spice cake.

### *Cookies for Children*

No story on cake would be quite complete without speaking of the cookie, that companion of our childhood days. Who of us has lived so long as not to remember that old cookie jar in mother's pantry? Cookies not only have a nutritional value but an educational one as well. Many a youngster has learned the names of animals from cookies fashioned to represent them.

It would be some task to enumerate all the varieties of cookies for their name is legion. In general they are made of the same constituents as cake, but as a rule they contain less butter and eggs and more milk and they are especially suitable for children. Dr. Philip B. Hawk, who carried on extensive nutritional experiments at the Jefferson Medical College some years ago, claims that cookies are even more easily digested than cake. Why they should be, he does not explain.

Cakes are real foods. They should not be regarded solely as confections to tempt the jaded appetite, but for what they are —good sources of food essentials.

More will be said about cake in a succeeding number of Baking Technology.

## *Sensible Dietetics*

A few years back, they lectured us
By word of mouth and books,
About the perils we incurred,
The frightful risks we took,
If, goaded by our appetites,
We should of meat partake;
And we said: "How interesting"—
And went out and bought a steak.

They used to tell us if we ate
White bread from day to day
We'd die a prey to all the ills
That can afflict this clay.
The husk of grains alone could keep
Our bodies with our souls;
And we said: "Would you believe it?"—
And we ordered nice hot rolls.

And now the latest thing is meat;
Our thyroids need its whip!
For with its acids amino
We'll go a lively clip.
And bran, you see, is not so good;
It's starch that fills the bill—
While we all eat the same old things
We always did—and will.

Frances Boyd
—Chicago Daily News.

## *The Pie Pipers*

We lead in pies.

Some nations are cleverer than we in concocting pastries, but in the old American breakfast food, the pie, we have no rivals. So the bakery engineers say, in convention assembled, and they should know.

The pie, they tell us, is a perfect food. Built right—and we build them right—pies are like Dazzy Vance, they have everything—proteins, vitamins, and carbohydrates. The strength of wheat, the digestibility of milk, the fascination of fruit are all combined in pie. Children cry for pie, and should have it.

—Chicago Herald and Examiner, March 19.

## *Food Faddism Must Be Discouraged*

IN addressing the Chicago Dairy Lunch Club, Dr. E. V. McCollum, one of the world's leading authorities on nutrition, in answer to an inquiry as to the value of different types of breads in the diet, said:

Whole wheat is more complete than refined white flour but it is not a complete food and must be supplemented the same as white flour, although white flour needs a little more supplementary material than whole wheat flour. White flour and milk make very nutritious bread. Bran has no virtue except that it is very hard to digest.

In answer to the query: Is it feasible to feed a nation such as ours on whole wheat —I am prepared to say that it is quite possible to get satisfactory results with bread made from white flour if proper foods are eaten with it. The most important thing is the right combination of food. Many people are trying to teach the public what it should know about nutritious foods and frequently many of these people are quacks who make misleading statements. This is a serious matter. We do not want any faddism in the food program. We must give serious thought to the whole subject of nutrition and devote our efforts to teaching people the right food combinations.

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You are to be congratulated on the appearance and text of "Baking Technology." It certainly contains excellent articles and we are more than pleased to receive it.

**M. E. Jaffa,**
**Director, Bureau of Food and Drugs,**
**California State Board of Health.**

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"I know of only two ways to increase the total volume of any business: First, by increasing the number of customers. Second, by increasing the sales to each customer." **—Harry A. Earnshaw.**

## *Family Food Budgets*

UNTIL we have given systematic and constructive thought to the question of how much a food product costs we cannot make an intelligent food budget. Common sense will teach that with a certain fixed sum for each of the main classes of foods we must let those classes be represented by food products that furnish the most for our money. Take bread, for example. Some of us remember when we could get a five-cent loaf or a ten-cent loaf. This may perhaps be called "the good old days," but when the cost of bread is under consideration we find that when we pay eight or ten or fifteen cents today for a loaf of bread we are getting eight or ten or fifteen cents' worth of actual food. The modern loaf contains milk. Government standards call for one part milk to every two parts of water in making bread. This means that we are getting at least an appreciable proportion of our milk requirements in a modern loaf. Bread also contains fat, some sugar and considerable starch, and, if bought from a reputable baker, is a good, all-around food that renders a good amount of things from the standpoint of food value per penny expended. These points are typical of what the housewife should consider when determining the actual cost of bread.

**—Winifred Stuart Gibbs, Food Specialist.**

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## *Has Ignorance a Saving Grace?*

ANY possible influence food faddists might have in converting normal men with normal appetites to their strange dietary notions is usually destroyed by the very absurdities of their arguments.

The following reason for eating a different bread is typical of most of the advice so freely handed out in effort to sell some old and simple food through the magic of a wierd psychology and an amazing science.

"Why choose five slices of pretty white bread," says a leaflet printed for the edification of patrons of the Arcade Cafeteria, "when one slice of Our Rich Entire Wheat Raisin Bread will furnish far more Real Food Value?"

Why, indeed, except that slice for slice and pound for pound there is no form of bread, whole wheat or brown, Johnny cake or flapjacks, which is richer in real food value than good white bread. And the cafeteria customer who vainly fancies that a single slice of any sort of bread will energize him as fully as five well buttered slices of white bread will soon join the ranks of malnourished exponents of strange diets.

## *The Food Menace*

It is a fortunate fact that just at the time when we begin to be worried about our health and are in a state of receptivity for every suggestion from friend or faddist as to what sort of a diet will cure our fancied ills something happens which throws the saving grace of humor into the situation and keeps us out of the pitfalls of dietetic adventurings. The Chicago Daily News prints a timely story for that unfortunate group which eats by rule rather than by choice.

"No meat, no white bread, no sugar, no milk and no butter," announced the hungry haberdasher to the saucy waitress at the lunch counter around the corner. "I can't eat any of those things. I'm on a diet."

"Well, what are you going to eat? That's what I want to know," returned the saucy waitress.

"That's just what I asked the doctor when he started reeling off the things I wasn't to eat, like a depot spieler calling off the places where you could go on the next train. I said, 'Doc, what do I eat?' And he said, 'One thing at a time,' and reaches down in his desk and pulls out a great big long list of things I wasn't to eat.

" 'Good-night, doc!' I said. 'Has eating got to be the menace we have to view with alarm? People used to say cigarettes were injurious and mushrooms would kill you and ice water was very bad, and now they've put the ban on eats.'

"The doctor said, 'Oh, no; you can eat lots of things, such as lettuce and cabbage and leaf vegetables that grow on top of the ground, but no vegetables that grow under the ground. And you've got to eat 'em raw, not cooked. And you can have fruits, such as apples and pears and fruits that have no pits, but not cooked fruit.'

"I said, 'Doc, why can't you give me a good big box of pills, same as you used to do, and some spoonful stuff to take before and after eating, and let it go at that? Half a dozen pills and eleven spoonfuls of stuff have always fixed me up fine heretofore.' But the doctor said no, he couldn't do that; I'd have to go on a diet. Spoonfuls and pill treatment wasn't being done any more. He said it wouldn't be long before I'd be feeling fine. I said, 'How long?' and he said that six or eight months of strict diet would set me up in great shape.

"I said, 'Doc, can't I double up on the thing and eat six heads of cabbage a day and get done with it quicker?' And he said, 'Sure! Double up on it as much as you please.' So bring me a dozen heads of lettuce and half a dozen cabbages and some whole wheat bread and five glasses of water."

Finally, having given his order, the hungry haberdasher watched a woman eat whipped cream souffle, a man eat mince pie a la mode and a little boy and girl eat fried ham and fried potatoes.

## *Causes of Malnutrition*

"THE state of malnutrition which exists today among the children of the poor is due not merely to a lack of a sufficient amount of the right kind of food, but also of the necessary vitamins and mineral salts," says Sir Wilfred Beveridge, Medical officer of health of London, in the Journal of the Royal Sanitary Institute. "Children are subjected to a dietary composed almost entirely of carbohydrates or starchy food and sugar when to obtain normal growth food from animal sources is required. Milk, meat, butter and eggs, are absolutely essential. The value of milk, however, is not to be rated too high if its vitamin content has been depreciated by stallfeeding cattle in winter or by excessive reheating of pasteurized milk, in which case the possible vitamin C deficiency must be made up by additions of orange, swede, or tomato juice to the young child's diet."

### *Yeast is Rich in Vitamin B*

"Vitamin B, present in eggs, internal organs of animals, nuts, yeast, whole meal, fish roe, milk, and vegetables, must also bear a definite proportion to the amount of food eaten. Undernourished people specially should make sure that a plentiful proportion of natural foods is represented in the diet."

The partiality of the public for colored foods is recognized by Sir William as instinctively sound. Yellow milk and butter, and green vegetables are preferable to white varieties for natural yellow milk contains a higher proportion of vitamin A than white, and green vegetables are richer in vitamin C then bleached varieties. Yellow turnip is rich in vitamin, while the white variety has practically none.

Deficiency in mineral salts is coming to be recognized as responsible for both physical and mental defects, and this matter is the more complex because a deficiency of one mineral may result in loss of value in another. For instance, if iodin is lacking, the metabolism of calcium is disturbed. Iodin is concerned also in the metabolism of fats. Diets rich in fat can quickly exhaust the iodin supply in the thyroid gland. If iodin is insufficient, fat cannot be sufficiently oxidized in the body and is stored, giving rise to obesity, according to the author.

### *Milk Bread Corrects Lime Deficiency*

Calcium or lime in the dietary is essential to the tissues of the bones and teeth. It is also necessary for the clotting of blood when exposed to the air and is concerned in the digestion of fats. Many cases of arrested development in children are due to calcium deficiency. In the mixed diets of the present day calcium is more frequently deficient than other salts. White bread (unless made with milk), highly polished rice, sugar, and milled cereals lose half their lime in manufacturing processes. Fruits and vegetables supply lime, as do eggs, beans, peas, almonds, but richest of all are milk and cheese. Milk is the best safeguard against lime deficiency."

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## *Methuselah*

Methuselah ate what he found on his plate
And never, as people do now,
Did he note the amount of the calorie count—
He ate it because it was chow.
He wasn't disturbed as at dinner he sat
Destroying a roast or a pie,
To think it was lacking in lime or in fat
Or a couple of vitamins shy.
He cheerfully chewed every species of food,
Untroubled by worries or fears
Lest his health might be hurt by some fancy dessert,
And he lived over nine hundred years!

—**Medical Sentinel.**

# Certified Baking Materials

## *Our Government Follows Institute's Registration Work in Drafting Specifications Certification Plan*

ONE of the first constructive measures undertaken by American Institute of Baking was the certification of baking materials which upon examination were found to comply with the provisions of the Food and Drugs Act and to be honestly labelled and sold. In the six years the Institute has issued registration certificates, 110 brands of shortenings, malt syrups, baking powders, salts, whole wheat flour, milk, oils, yeast foods, sugar, etc., have been analyzed and approved. This method of certifying the quality of materials has been of much value to the baker who wished to know the character of his purchases and to the manufacturer of products which passed the rigid inspection. The only criticism of the certification plan has come from manufacturers and dealers in products which did not meet the requirements of the Institute laboratories or which were sold under misrepresentations as to value or quality.

### *Bureau of Standards Guards Commerce*

The Bureau of Standards of the Department of Commerce of the United States is charged with the duty of establishing standards of every description which will assist industry and control trade practices. The master standards of weight and measure are kept at the Bureau of Standards. Much of the helpful legislation affecting standards has been drafted by the Bureau and is administered through its officials.

In line with the efforts of Secretary of Commerce Hoover to simplify manufacturing practice by cutting out all unnecessary forms and items and by the adoption of uniform specifications for materials wherever possible an Advisory Board of representatives of technical societies, trade associations and purchasing agents has been at work on a plan for certifying materials. The merit of such a plan is described by Dr. George K. Burgess, Director of the Bureau of Standards, as of fundamental economic value through buying and manufacturing to nationally recognized specifications.

### *How the Certification Plan Works*

In a recent letter the need of a general understanding of the plan is stressed in the following paragraphs:

Notwithstanding the immense amount of time and labor represented in the formulation of specifications, the fact remains that many excellent specifications well recognized throughout industry are not being widely used at the present time because of the inability on the part of most purchasers to determine whether or not commodities delivered correspond to the specification requirements. A great impetus to the popularizing of the use of specifications could be given by eliminating this disadvantage to the small-quantity purchaser.

As a solution to this problem, it has been proposed to have the seller certify that the commodities delivered have been tested by him and found to comply with certain well established specifications.

Such benefits as are now derived from the use of specifications by large consumers would be made immediately available in full measure to the small consumer, with incidental advantages to the larger consumers of convenience in ordering and accepting commodities and of lessening the price by reason of the broadening of the field of supply.

It would seem evident that to whatever extent the proposed plan could be made effective throughout industry the manufacturers would benefit from the well-known economies accompanying "mass production."

Numerous purchasing agents who are desirous of making use of certain admittedly advantageous specifications are not doing so because of the lack of information as to manufacturers willing to supply commodities meeting these specifications.

### *Form Letters Avoid Unfairness*

It has been suggested that form letters recommended by the Bureau could be circulated with great benefit to all persons concerned, and without encountering any of the difficulties that would surely arise if an attempt were made to give publicity to a list of "trade brand" or other manufactured commodities complying with well-established specifications, or even to supply a list of manufacturers the commodities of which have been found to comply with the specifications.

Among the duties assigned to the Federal Specifications Board are not only the compilation and adoption of standard specifications for materials and services, but also the bringing of the Government specifications into harmony with the best commercial practice whenever conditions permit, bearing in mind the broadening of the field of supply.

Encouraging the maximum possible number of purchasing agents to make use of the specifications of the Federal Specifications Board would broaden the field of supply by inducing the maximum possible number of producers to manufacture commodities meeting the requirements of the Federal government. Moreover, the widespread use of specifications of the Federal Specifications Board would serve to draw attention to such modifications as might well be made therein in order to render them satisfactory to the buying public, and to bring them into harmony with the best commercial practice.

### *Trade Associations Force Plan*

It was to be expected that technical societies familiar with the formulation of specifications would be in favor of the proposed plan. Correspondence has brought to light the fact that many trade associations that might have been assumed to be opposed to the plan, at least initially, are actually very favorably inclined toward it. In fact, trade associations not only can promote, but actually are promoting, the use of specifications in numerous ways—with great benefit to their industries. At the present time various trade associations are carrying on many activities having a direct bearing on the promotion of standards and specifications. and such associations are willing to become very active in the proposed certification plan.

To what extent, and how rapidly, it will prove possible to convince manufacturers in general that a thoroughly organized standardization plan would be beneficial to them can not now be predicted. However, there are reasons for believing that many manufacturers who are not very enthusiastic over standardization can be shown by their trade associations the value of standardization in their business—through mass operation in production, elimination of waste in manufacture and distribution, and minimizing of sales expenses. It is believed that the education of the manufacturers along these lines is a service that trade associations might well render to their members, with great benefit to themselves.

Trade associations representing either dealers or manufacturers reaching consumers through retailers, can be of much help in showing the dealers and retailers how they (as both purchasers and sellers) will benefit from the plan.

A final step for the trade association to take, when the time seems ripe for it to do so, is to make sure that its members are keeping faith so far as the certification plan is concerned.

### *Government Policing is not Essential*

Misrepresentation might be a proper subject for Federal Trade Commission action, but doubtless non-governmental agencies for accomplishing the same result would be even better. To what extent the various industries, through their trade associations, can do "policing" remains to be demonstrated, but it seems not to be essential for the Government to do "policing" work in order to make effective the proposed plan for promoting the use of nationally recognized specifications.

Opinions may differ as to the proper method or methods of bringing them into existence, but doubtless all will agree that considerable economy to the country as a whole would result from the establishment of satisfactorily co-ordinated methods of specifying, manufacturing, testing, and accepting commodities.

To the extent that the certification plan will result in the standardization of such commodities as can properly be standardized, its benefits will be felt by those affected by standardization, either directly or indirectly, whether or not they make use of the certification plan themselves. In addition to the public purchasers and institutional and other large-quantity buyers who can conveniently make use of specifications in accordance with the certification plan, there are numerous small-quantity purchasers who cannot be expected to buy on specifications but who should be permitted to share to the maximum possible extent in the well-known economies incident to "mass production" of the commodities bought by them.

To this great group of buyers, the best safeguard so far as quality is concerned is the "label" backed by a guarantee issued by a reliable inspecting and testing agency.

### *Obtaining Money under False Pretenses*

Misrepresentation in connection with the certification plan is the equivalent of "obtaining money under false pretenses." It means also obtaining by false representation business which rightly belongs to the manufacturers' competitors, so that the competitors are more vitally interested in the unethical practices of a manufacturer than is the isolated purchaser. Trade associations can become very active in backing up the certification plan by serving as an agency through which the various manufacturers keep watch on their competitors.

The carrying out of the certification plan would mean that more manufacturers than at present will be in need of testing and inspection services upon which to base such certificates as they may be asked to issue to consumers buying upon nationally recognized specifications. Weight will be given to the certificate according to the reputation for accuracy and reliability of the manufacturer or the certifying agency.

To the small-quantity purchaser who cannot make use of written contracts in obtaining commodities, and must depend upon the local merchants to supply his needs, the use of a label backed by a guarantee that means what it says is the most valuable and immediately available of the protective plans.

What would surely result from the wide application of the plan would be a general recognition of specifications as the proper, logical, and economical basis of the contract between the buyer and the seller. Ultimately production and distribution wastes would be reduced to the minimum.

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May God give daily bread, without shame or poverty, and then a happy death.

—Old Danish Proverb.

# Coke for Bakers' Ovens

## *Its Composition and Fuel Value*

By W. C. Luckow

COKE is an important domestic and industrial fuel. In 1922 the total production of coke in the United States was *37,124,012 short tons valued at $238,313,323. During this same year the total production of anthracite and bituminous coals in this country was 476,951,121 short tons valued at $1,548,520,000. Since coke is such an important fuel and as it is extensively used in the baking industry a general discussion as to its manufacture, properties, uses, etc., together with a summary of analyses of cokes received at the Institute and a description of a comparative experiment with coke and coal performed at the Institute should be of interest to bakers.

Several kinds of coke are available for baking ovens, which may be described as follows:

### *Bee-Hive Coke*

Bee-hive coke is the coke produced in bee-hive coke ovens. The bee-hive oven, as its name implies, is similar to a bee-hive in form. It is about 12 feet in diameter and 7 feet high, and about five or six tons of coal are coked at one time. The oven is lined with refractory brick and is constructed in such a way that it will retain the heat. The ovens are usually built in double rows with a track on top to bring up the coal. An opening at the top serves for charging the oven and for the escape of products of combustion and volatile matter. The heat necessary for coking is furnished by the burning of a part of the coal. After the coking operation, which usually requires from 48 to 72 hours is completed, the fire in the oven is quenched with a stream of water after which the coke is withdrawn.

For truly coking coal the bee-hive oven is well adapted and the ovens are usually built at the mines, but its use for the manufacture of coke is limited because of its shape and the inefficient manner in which the heat is produced and utilized. In addition to limited usefulness, because of construction features there are other factors which limit its usefulness, such as the scarcity of coal suitable for making coke in bee-hive ovens and the increasing demand for the by-products of coke. These difficulties have led to the manufacture of by-product coke.

### *By-Product Coke*

By-product coke is coke manufactured in by-product coke ovens, so called because ammonia, benzol, toluol, tar and other valuable by-products are recovered by this process. In the bee-hive process, these valuable by-products are not recovered.

The by-product process for coking coal is comparatively recent. The first by-product ovens built in the United States were the American Semet Solvay ovens built at Syracuse, New York in 1893. The by-product coking industry has been developing rapidly until now a larger percentage of coke is produced by this method than by the bee-hive process and indications are that the by-product industry will continue to grow and the bee-hive industry will continue to decline. More than three-fourths of the coke produced in this country is produced in by-product ovens.

The modern by-product has been designed to overcome the difficulties of the former inefficient ovens. The ovens are rectangular in shape and are usually constructed in batteries with a large number of ovens in each battery. The heat is supplied by the burning of gases in flues surrounding the combustion chamber. After the coal has been powdered it is charged into the coking chamber and heated until coke of the desired quality is obtained, after which the coke is removed from the oven and quenched with a stream of water. The volatile matter evolved during the coking process is passed through an apparatus to remove tar, ammonia, benzol, toluol and other valuable by-products before the gas is sent back to the flues to furnish heat for the coking process.

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*Mineral Resources of the United States, Department of Interior, U. S. Geological Survey, 1922.

Various kinds of by-product coke ovens, such as the Semet-Solvay and the Koppers are in use and coke is often referred to as Solvay coke or Koppers coke. The different ovens vary somewhat in construction and the processes vary somewhat in various by-product plants but they are in general very much alike.

### *Gas House Coke*

Gas house coke is coke made by gas companies in gas retorts. The process is somewhat similar to the by-product process but differs in the fact that in this process gas is the main object and coke is a by-product. Therefore, coals containing the highest percentage of gas forming substances are used and very little thought is given to the quality of the coke it will produce.

### *Petroleum Coke*

The three kinds of coke we have just described, namely bee-hive, by-product and gas house, are all produced from coal. Petroleum coke, unlike these others, is produced from petroleum. Petroleum coke is the residue left in the stills in the distillation of crude petroleum. It is very low in ash. An analysis of a sample which was submitted to the Institute laboratory gave an ash content of less than 1.5%, a moisture content of less than 0.5% and a fixed carbon content of over 90%. Petroleum coke is used to a considerable extent by bakers in localities where it is obtainable. A large Chicago bakery uses it successfully in combination with by-product coke. A low draft should be used with this kind of coke.

### *Analysis of Coke*

Coke may be analyzed either by ultimate or proximate methods of analysis. In the ultimate analysis, moisture, ash, sulphur, carbon, hydrogen, nitrogen and oxygen are determined. The heating value of the coke may be calculated from the ultimate analysis. The proximate analysis gives the data necessary for judging the character of a coke. Samples of coke received by the Service Department have been analyzed by the proximate method of analysis which includes the following tests: moisture, ash, volatile matter, fixed carbon, sulphur, and in addition the fuel or heating value of all samples has been determined by the calorimeter.

Moisture. The loss on air drying is first determined, and then the loss on drying a small sample of the air dried sample at about 105° C. in an oven. From this data the original moisture content of the coke is determined. All analyses are made on the air dried sample and the moisture data is used to calculate results to the "as received" basis. The moisture content of coke should be low.

Ash. The ash is determined by igniting a small sample at a low temperature. The ash content of coke represents inert matter and therefore the ash should be low.

Volatile Combustible Matter. The volatile combustible matter is determined by heating 1 gm. of the coke in a covered crucible at 950° C. for exactly seven minutes. The volatile combustible matter represents the readily combustible matter of the coke.

Fixed Carbon. Fixed carbon represents the combustible matter of the coke which remains behind for complete combustion after the volatile matter has been driven off. Fixed carbon equals 100 minus the sum of the moisture, ash and volatile combustible matter.

Sulphur. Sulphur is determined by the Eschka method.

Heating Value. The heating value is determined by the use of a suitable calorimeter. The heating value is expressed in British Thermal Units (B. T. U.). A British Thermal Unit is the amount of heat necessary to raise 1 lb. of water 1° F.

### *Cokes Received at the Institute for Analyses*

The analyses of twenty-one samples of coke received from bakers and coke dealers in various parts of the country are shown in Table I. A few of these samples were accompanied by descriptive information. Sample No. 770 was described as a 48-hour coke and cost $10 a ton. Sample No. 771 was described as a 72-hour coke and cost $12 a ton. Sample No. 772 was described as a Gas Company coke and cost $8 a ton. All three of these cokes were received from the same baker and it is interesting to note that the two samples of coke which cost the least had higher heating values and lower ash content and may have been more suitable to the bakers' needs than the high priced coke with its higher ash content and lower heating value.

Sample No. 5475 is abnormal and unusual. It contained approximately 27% of fine material passing a one-quarter inch screen. This material included coal, coke, wood, pebbles, glass, dust, etc. In addition, about 4% of coal, glass, stone, etc. of larger sizes were picked out of the sample. The remainder of the coke was not very uniform in size. This sample, as shown in Table I contained 23.73% of ash, the highest ash content of any of the samples listed, and the heating value was only 10,966 B. T. U., which was the lowest of any of the samples listed, being nearly 2,000 B.T.U. below the average.

**Coke Analyses**

TABLE I

| Sample Number | Total Moisture as Received | Ash | Volatile Combustible Matter | Fixed Carbon | Sulphur | Heating Value in B.T.U. |
|---|---|---|---|---|---|---|
| | % | % | % | % | % | |
| 770 | 1.39 | 12.71 | 4.83 | 81.07 | 1.93 | 12,463 |
| 771 | 0.31 | 16.89 | 2.67 | 80.13 | 1.07 | 11,839 |
| 772 | 0.59 | 12.07 | 3.49 | 83.85 | 1.01 | 12,229 |
| 1102 | 1.67 | 14.16 | 4.78 | 79.39 | 0.10 | 11,762 |
| 1103 | 5.45 | 10.52 | 2.98 | 81.05 | 0.06 | 12,428 |
| 1364 | 0.35 | 14.99 | 2.51 | 82.15 | 0.79 | 12,319 |
| 1365 | 0.07 | 12.85 | 1.56 | 85.52 | 0.71 | 12,414 |
| 1754 | 0.34 | 12.82 | 2.41 | 84.43 | Trace | 12,454 |
| 3412 | 1.74 | 12.50 | 2.92 | 82.84 | 1.08 | 12,449 |
| 3413 | 0.10 | 10.87 | 1.93 | 87.10 | 0.81 | 12,908 |
| 5093 | 0.42 | 6.77 | 2.71 | 90.10 | 0.59 | 13,425 |
| 5094 | 0.32 | 12.13 | 2.75 | 84.80 | 0.89 | 12,712 |
| 5475 | 1.34 | 23.73 | 11.30 | 63.63 | 1.13 | 10,966 |
| 5501 | 1.05 | 11.99 | 3.62 | 83.34 | 0.60 | 12,393 |
| 5635 | 0.06 | 9.93 | 3.50 | 86.51 | 0.18 | 13,225 |
| 5874 | 0.42 | 14.68 | 1.72 | 83.18 | 0.77 | 12,829 |
| 5875 | 1.53 | 3.79 | 7.39 | 87.29 | 0.45 | 14,472 |
| 7143 | 0.20 | 10.02 | 3.00 | 86.78 | 0.71 | 13,227 |
| 7144 | 1.64 | 8.63 | 12.24 | 77.49 | 0.56 | 13,499 |
| 7145 | 0.17 | 11.10 | 3.05 | 85.68 | 0.76 | 12,973 |
| 7146 | 0.27 | 8.31 | 3.01 | 88.41 | 0.69 | 13,153 |
| Max. | 5.45 | 23.73 | 11.30 | 90.10 | 1.93 | 14,472 |
| Min. | 0.06 | 3.79 | 1.56 | 63.63 | Trace | 10,966 |
| Average | 0.93 | 11.97 | 4.02 | 83.08 | 0.71 | 12,625 |

### *Discussion of Analyses*

From an examination of the analyses in Table I it is evident that it is very advantageous to have coke analyzed, especially if it is purchased in large quantities. Certainly no baker would care to purchase a coke with 23.73% ash content if he could get one with 3.79% ash. No baker would even care to purchase a coke with 11.97% ash which was the average amount of ash found, if he could get one with 3.79% ash, which was the lowest amount found. The higher the amount of ash present the more the time and labor necessary and consequently the more it will cost to remove it. There is not only a wide difference between the heating values of the poorest and best cokes, but also between the average coke and the best coke. We have found therefore much variation in the cokes we have analyzed.

### *Coke versus Coal in our Bakery*

A very interesting experiment has been performed during the past months to determine whether it is more economical to use coke or coal in our bakeshop. The oven used for the experiment was the 10 by 12 foot Duhrkop oven which is used by the students of the School of Baking.

The experiment was divided into two parts. In the first part a hard coal with the following analysis was used:

TABLE II

**Analysis of Coal Used in Experiment**

| | |
|---|---|
| Total moisture as received | 2.94% |
| Ash | 7.95% |
| Volatile combustible matter | 9.31% |
| Fixed carbon | 79.80% |
| Total | 100.00% |
| Heating value in B. T. U. | 13,170 |
| Sulphur | 0.86% |

The coal was of about 3 inch size and was very uniform.

In the second part of the experiment a coke with the following analysis was used:

TABLE III

**Analysis of Coke Used in Experiment**

| | |
|---|---|
| Total moisture as received | 0.08% |
| Ash | 12.05% |
| Volatile combustible matter | 1.30% |
| Fixed carbon | 86.57% |
| Total | 100.00% |
| Heating value in B. T. U. | 12,796 |
| Sulphur | 0.63% |

The coke was very hard. The pieces were about 3 inches in size and the size was very uniform.

The experiment with coal was carried out in our school bakery during the entire school term of April to August, 1925, and the experiment with coke during the entire school term of August to December, 1925. The coal and coke were each fired in our Duhrkop oven, by hand, under similar conditions. The oven was used by the students in our bakeshop to carry out the baking experiments assigned to them during the school term. Since each school term is of about four months' duration and since the baking experiments assigned in each term are very nearly alike, a comparison of the amount of coal and coke used should be of considerable value. The amount and cost of fuel for the coal and coke experiments are given in Table IV.

TABLE IV

| | |
|---|---|
| Course April-August— | |
| 20 tons hard coal | $333.00 |
| 3 loads of wood | 18.75 |
| Total | $351.75 |
| Course August-December— | |
| 13 tons of coke | $177.00 |
| 2 loads of wood | 13.00 |
| Total | $190.00 |

We have therefore saved $161.75 in four months by changing from hard coal to coke in our bakeshop. Not only was there a considerable saving in money but also the actual weight of fuel used was nearly cut in half.

Although these results apply only to our own particular draft conditions, method of firing, type of oven, conditions of use, etc., bakers may find that they are able to make considerable savings by conducting a simple experiment such as we have performed.

### *Choice of Coke for Use*

Since the requirements of individual bakers vary in regard to the heat conditions in their ovens, it is impossible to give specific directions for the choice of coke which will fit all cases. Each baker should choose the type of coke which best fits his draft conditions, type of oven, method of firing and which gives the desired heating effect. Coke should be properly sized, free from excess water and the ash content should be as low as possible. If a slow burning coke is desired, or where the draft is strong, or where a slow steady heat is desired, a hard dense coke should be used. If a quick fire is desired, or if the draft is low, an open cell free burning coke would probably give the best results. The coke should be clean, free from breeze (fine material) and should be sufficiently tough to resist excessive breakage in handling. It should preferably be low in sulphur content.

Bakers are sometimes confronted with the terms 48-hour coke, 72-hour coke, etc. These refer to the time of coking. In general, the shorter coking time will give a softer and more rapid burning coke than the longer coking time which gives a harder, denser, slower burning coke. Likewise the terms "low temperature" and "high temperature" coke refer to the temperature of coking. A low temperature coke will in general be a softer, more rapid burning coke than a high temperature coke and will contain more volatile matter.

The choice of a proper fuel is very important and the baker should give the problem considerable attention because it is one that often gives very profitable returns.

## *Chinese Flour*

In China they make over fifty kinds of flour. They make flour out of rice, peanuts, beans, potatoes, peas, millet, pulse, bananas, cocoanuts—in fact, they make flour out of everything but wheat. Oh, well, who wants to be a Chinaman anyhow?

Arise, and eat bread, and let thine heart be merry.—Kings xxi. 7.

## *Diet Boosters*

IN HIS rhymed soliloquies on all manner of things Walt Mason throws a very clear and practical light on our foibles. His jingling lines are crowded with sound philosophy and his Kansan interpretations of the incidents of daily life merit thoughtful reading. Mason had evidently encountered one of the self-appointed disciples of strange dietary habits when he wrote the following satire on the prune and codfish devotees.

"I meet all kinds of diet fans, and each one throws a spasm and tells me of his feeding plans with glad enthusiasm. There is a park hard by my shack, and there I often loiter, and tell of anguish in my back, of mumps and itch and goiter. Then there is sure to be a wight who's had the same diseases; for years he suffered, day and night, and felt like Sweitzer cheeses. At last he read in some old tome that prunes have healing merit, and now he's filled, from heels to dome, with joy and wants to share it. 'Eat prunes,' he says, 'three times a day, and nothing else beside them, and all your ills will fade away; destruction will betide them.' 'I had the gout,' an old man calls, 'which threatened to destroy me; I started eating codfish balls, and now no pains annoy me. Eat codfish balls is my advice, it is a diet proper, and soon you will be feeling nice, and fit to whip a copper.' A gaffer gray remarks, 'Dear folks, such things are good, I grant you, but naught compares with artichokes, when aches and anguish haunt you. If you have stitches in your side, if other ailments hurt you, eat artichokes, the boiled or fried—your ills will all desert you.' All day they sit, the good old lads, and talk, with warmth and feeling, of all their systems, creeds and fads, and miracles of healing."

Bread is better than the song of birds.
—Old Danish Proverb.

# The Truth About Food Fads

By Agnes Fay Morgan

***Professor of Household Science, University of California****

CERTAIN matters concerning the use of food have recently been made the subject of public discussion by selfish commercial interests and faddists. Only one or two of the commonest of these misstatements can be discussed in the space available. One of these frequently heard is that only natural, fully mature food from the vegetable kingdom should be eaten and that refined foods are degraded and dangerous. But who shall judge what natural, fully matured foods are, since practically all vegetable material used as food contains indigestible material which for man at least is not food at all. All cereals, vegetables and fruits contain from 1 to 10 per cent of this refuse which may exert injurious effects in the intestine, particularly in children and those having any digestive trouble. The refined foods referred to are extracted from these inedible hulls for safer use in large amount by the evolved and more delicately constructed digestive apparatus of humans as compared with animals like the cow or goat. Advancing civilization and increasing population makes this necessary economically as well as desirable physiologically. Thus sugar from the beet and cane is added to our resources, oil from cottonseed, flour from grains, gelatine from bones, and innumerable other concentrates from what would be of themselves inedible sources.

### *Mineral Losses Not Important*

But these foods have lost many of the elements present in the rough state from which they emerged. Must we discard them for that reason or may we instead supplement them with the needed substances lost? Surely the latter is the most economical and intelligent choice. You are told that sodium and calcium are lost in the refining of food, especially of grains such as wheat. But sodium forms 40 per cent of common salt. Is it likely that this element will be lacking in any ordinary diet? Calcium is present in whole milk or skim milk in plentiful amount, .12 per cent, so that a diet including any reasonable amount of milk, for adults 1 to 2 glasses per day and for children 2 to 3 glasses, will supply the necessary calcium, even if the other foods taken contained none whatever, a supposition which is absurd.

Again the use of natural fully matured foods in the original state offered us by nature, unless a considerable variety is used, will not provide the nutritive substances required for human growth and well-being in the right proportions. For example, animals fed on whole wheat or whole rice in our laboratory and given the necessary mineral salts and vitamins in addition failed to make normal growth until 5 per cent casein, a purified protein from milk, was introduced to the diet. Evidently these grains in addition to their known deficiencies in vitamin A and in mineral content are of limited protein value. This is a serious handicap, since protein is the material out of which our chief body tissues are made. It seems hardly likely that the human body can thrive any better on a diet of this kind than can these laboratory animals which have been shown by many investigators to need the same elements in almost the same proportions and to use them after digestion in much the same sort of digestive tract as do human beings.

### *Unsound Science Dangerous*

Another often heard statement is that

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* As printed in the California Alumni Monthly for Feb. 1926.

starchy and acid foods must never be eaten together. To quote a statement being made by a so-called "food lecturer" recently, "Do not take into the mouth any starchy food together with any liquid or any food of an acid nature." This idea possibly originated from the observed fact that the starch-digesting enzyme of the saliva is rendered inactive in acid solution. But in the stomach the digestive juice is strongly acid, and salivary action is there greatly reduced under any conditions. The momentary action of the saliva upon starch is generally considered relatively unimportant, since full starch digestion proceeds in the intestine under the influence of the pancreatic juice, and after the acid interval of the stomach period. Emphasis out of all proportion to the proved importance of this detail has been given to the matter of starch and acid combinations.

It is safe to say too that no food which is good in itself is rendered harmful by combination with any other food. Combinations of food may be inadequate but never injurious merely because of the combination.

## *The Passing of Homemade Bread*

EVERY steam heated flat dweller thinks wistfully now and then of his boyhood home, of his feather bed up under the eaves and of the fragrance of his mother's kitchen on baking day. But if he now had to crawl into that bed at the end of a cold winter's day he would cheerfully swap it and all the glories of country life for the comfort of his warm in-a-door. And his memories of homemade bread grow a little more dim every time he rounds the corner bakery at the turn of his street and catches the full fragrance of its artistry.

Even editors forget the present and slip back retrospectively to those good old days which are never so good as when viewed over the long range of passing years. And then they usually write a stickful or two about Mother's bread. The editor of the Cobleskille, N. Y. Times had such a mental reversion recently just as he was starting home for dinner and before he put on his rubbers he sent this half regretful, half thankful paragraph down to the composing room.

"Every old fashioned husband has known for a long time that home bread making is out of fashion and now the home economics department of the New York State College for Teachers has officially declared bread baking an unnecessary home accomplishment.

The good housewife of the future and of the present need not know how to bake bread. She can buy good bread cheaply at the bakery. It takes too long to teach bread baking as it should be taught, the economics department holds. Even so, it should not be a lost art among girls.

It is true enough that baking bread at home is hard work and is not at all necessary in this age. It is true that the younger married men no longer boast of the home made bread that their wives bake. But every little while the older husbands wish they could have some of that home baked bread. Home brewing, however, is probably more common now than home bread baking. Once in a while in the villages or in the country you will find home made bread and it tastes good enough to serve as dessert to the modern meal.

Yet the next generation will never know what home made bread is or home made ice cream. And housewives of the future will have a far easier time in many ways than did their mothers and grandmothers."

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From bad baked bread, an ignorant doctor, lightning and storms, Lord, protect us.

—Old Latin Proverb.

# The Proteins of Our Food

## *Their Role in the Newer Knowledge of Nutrition*

By Roscoe H. Shaw
***Chief Department of Nutrition, American Institute of Baking***

AT the end of the 19th century it was generally believed that our knowledge of the chemical composition of foods was in a fairly satisfactory condition. The perfection of simpler and more rapid analytical methods had placed in the hands of the chemist means for the study of foodstuffs which had not hitherto been possible. Our knowledge of food values at that time centered around the old trio, proteins, carbohydrates, and fats, with a little attention to the mineral constituents. It was known that proteins from different sources differed in their characteristics, but the possibility that they varied in their food value was hardly appreciated. Chemists were content to evaluate food by the simple assay of the nitrogen, carbohydrates, fats, and sometimes the ash. If the food was found to contain these essentials in sufficient amounts it was considered to be satisfactory.

Voit in Germany, and Atwater in this country, had analyzed in the chemical laboratory, the whole category of human foods and published their results in lengthy articles which seemed to settle for all time the whole question. Atwater in particular, spent almost a lifetime in this sort of work and his results today are considered standard as far as they go. In the early 90's Osborne of Yale began his classic researches in isolating and identifying the various proteins from different sources, which paved the way for our present day knowledge of that valuable part of food.

The advent of the 20th century marked the beginning of a new era in our knowledge of nutrition. Probably more important discoveries have been brought out since that time than in any 100 previous years. Early in the century Emil Fischer began his work showing that proteins may be hydrolized into amino acids. He and other workers have isolated in this way altogether perhaps 20 different amino acids. Some proteins have been found to contain the entire list, others are lacking in some of them, and no two contain the same amino acids in the same proportion. Workers in physiology have shown that in the process of digestion also the proteins are broken up into their various amino acids which are then carried through the liver by the blood stream to the various cells where they are used for purposes of construction and repair.

Proteins of the body are likewise made up of amino acids and as with food proteins, no two of these are alike in number or proportion. There has been some dispute as to whether or not the body can manufacture amino acids. It has been shown that it can do so in the case of one or two, but in general it is believed that at least the great majority of the amino acids must be presented in the form of proteins. The amino acids are the "building stones" with which the body builds or repairs its tissues. It can readily be seen that no one protein can possibly fulfill the requirements of the body and that a variety is absolutely necessary for our growth and well-being. An experience with gelatin may illustrate this point. At the time of the French Revolution when protein foods were very scarce in France, and almost prohibitive to the poorer classes, a method was devised for recovering gelatin from bones with the hope that this gelatin would serve as a dietary protein. History shows that when used as the sole source of protein, it resulted in a dismal failure. Years afterward it was found that gelatin is lacking in three or more of the amino acids, two of which at least can not be manufactured by the body, and are absolutely necessary.

Since Fischer's early work a great deal has been done on the chemistry of the proteins, and there is at present a Division in the United States Bureau of Chemistry devoted solely to this sort of investigation.

Entirely aside from the chemical composition of the proteins, is their digestibility. A great deal of work has been accomplished in this direction. In general it has been found that the proteins of meat and milk are practically all digestible. The legumes, such as the bean, pea, etc., are rich in protein but their rate of digestibility is low. It was at first believed that the digestibility of the cereal proteins was much below that of meat and milk, but more recently it has been shown that their digestibility depends quite largely upon the condition in which they are eaten, and that cooking has a beneficial effect upon it. Some of the cereal proteins are closely associated with the indigestible carbohydrates, such as fiber which is supposed to act as a sort of protective coating, preventing the digestive juices from acting upon them. It is now believed that the digestibility of the cereal proteins when released from their protective coating, closely approaches that of milk and meat.

In the metabolism of foods, protein of course serves a dual purpose, for it not only supplies the amino acids necessary for construction and repair, but may serve also as a source of heat and energy, if sufficient protein sparing food is not present. In order to learn the relative value of the proteins in the role in which they alone can act, that is, as cell repairers or builders, methods have been devised to show their utilization or biological value. Of course, unless the protein is digestible, it can not be utilized. On the other hand, the fact that it is digestible does not necessarily imply that it can be used as a cell builder or repairer. The utilization value of a protein is considered to depend entirely upon its chemical composition, that is, whether or not it will supply the required amino acids.

In their utilization value it has been likewise shown that the cereal proteins are not far behind those of milk. The utilization value of the legume proteins is however, distinctly low.

There is an important factor entering into the utilization value of the proteins and that is the plane at which they are fed. If the plane is so low that the protein can only be used for cell repair, that is, too low for both cellular repair and construction, the utilization value is considerably higher than when the plane is sufficiently high for both purposes.

Another fact of equal interest and importance is the supplementary value of proteins: that is, when two proteins are eaten together, their utilization value may be considerably higher than the mean utilization value of the two. Cereal proteins will not supplement each other to any great extent, but it is very marked when cereal proteins are supplemented with milk or meat proteins. This of course shows the great value of the milk proteins in bread making. In general it explains why it has been found more satisfactory to include both animal and vegetable proteins in the diet, rather than to limit them to either.

The question naturally arises as to what all this has to do with our own protein economy. It is quite generally believed that a man at ordinary work requires about 100 grams of protein per day. The classic work of Chittenden some years ago showed that 30 grams is quite sufficient for the body needs. If we require but 30 grams, and consume 100, it can readily be seen that we are on the safe side for it is quite unlikely that there would be less than 30 grams of utilizable protein in the 100 grams eaten. Then too, if we reduce our protein intake, its utilization value will be correspondingly increased. So under ordinary circumstances there is little chance of a protein deficiency. In the case of the growing child or nursing mother however, the quality of protein consumed is a matter of greater importance and care should be taken to supply proteins of high utilization value and good supplementary character. While the legumes are high in protein content, their utilization value is so low that they are not suitable for the purpose, certainly not when unaccompanied by other and better protein foods. More reliance should be placed on such foods as milk, eggs, meat, and milk bread.

## *Nature Never Made a Perfect Adult Food*

IN its column of Discussion and Correspondence Science for March 5 carries a very interesting story of the nutritional value of pure white flour and bread made from it as told by Charles H. Briggs of the Howard Wheat and Flour Testing Laboratory of Minneapolis.

The following paragraphs throw a much needed light on the foolish practice of feeding animals white flour in an effort to prove that white bread is an unfit food.

It is indeed a matter in which American millers take pride "that the flour of the country is gradually approaching the condition in which the bran and germ remnants are reduced to the greatest possible minimum," but it does not follow "that this means a more thorough extraction from the white flour of the vital elements of the wheat" or that "it is distinctly deteriorated in nutritional value." What is "nutritional value?" It is not claimed that white flour as purchased from the grocer is a perfect food. No one eats white flour. It is used in the manufacture of numerous articles of food which are eaten together with other foods.

What does it signify if fowls or white rats fed nothing but white flour die after a few months? The same thing will occur with almost any single food including even milk, which comes pretty near being a perfect food for infants. Even a liberal diet of graham bread would not supply sufficient iron or iodin nor even the important element calcium, since so large a proportion of the relatively limited amount of minerals in the branny portion of the wheat is indigestible in the human stomach. The mineral elements present in wheat and bran and flour are those of which there is little or no lack, viz., phosphorus and potassium, wheat ash being about three quarters potassium phosphate.

Feed the bran to cows, equipped by nature with digestive fluids containing enzymes capable of breaking down the cell walls of bran, alfalfa and other coarse fodders and let them supply us the necessary calcium and vitamins. Then make from milk, flour and yeast a good, rich milk bread which, with other ordinary foods, will contain most of the needed elements. A full milk loaf spread with vitamin-rich butter comes much closer than any single article of diet to supplying the nutritional value desired.

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We feel that Baking Technology gets down to fundamentals and common sense thinking with respect to the many sided problems of the industry. We need all such information we can get, as our business is tied up very closely with the baker's various problems.

—**Saniwax Paper Co.**

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Don't strike against your bread and butter. —**Old English Proverb.**

## The Perfect Bread

WE ARE still scoring bread by its physical qualities, by its appearance, its flavor, its saleability. But there is much more to bread than good looks. And the baker has a greater responsibility to his customers than the manufacture of bread which looks and tastes as they think it should. The rapid increase in the use of milk solids by the baker has added another factor to bread quality which should be taken into account. That is the factor of nutritional value. Two breads may be equally attractive. They may both score 90 or better and that is a very good score indeed. But one loaf may be filled with balanced nutriment added to it by the protein, ash and vitamins of milk, while the other is just bread. And that is a very great difference which the baker who appreciates the role he is taking in furnishing the most important article of food will not forget or underemphasize.

### *Better Bread for England*

English bakers are waking to the fact that their flour, yeast, salt and water bread is far from perfect. James Meikle, writing in The National Association Review, is very clear in his belief that bread laws and baker's skill must be revised and amplified until bread is in very truth a perfect food. And he thinks that the millennium in bread making cannot be far off. He says in part, "the most perfect loaf I have ever seen has been perfect only in certain ways. The Exhibition breads at London are the most perfect specimens of bread imaginable, to look at, but probably their perfections end there; at least no baker ever attempts to make such bread for sale.

"The perfect loaf, in fact has not been defined, but it may be assumed that it should be perfect not merely in texture, colour, flavour, volume and general appearance, but it should be perfect in so far as its food constituents are concerned, and this is one of the details seldom considered excepting by the food faddists, who see in it only the things that ought not to be there, viz., a preponderance of starchy material and an absence of life-giving mineral matter. Some time ago I met a man who had some ideas on the perfect loaf. He thought it ought to contain beef juice and tomato puree, the first for building up the system, the second to prevent cancer. This man was quite sincere and he thought there was a fortune awaiting the baker who followed at least the beef juice part of the plan of making perfect bread. The idea might be elaborated considerably. Why shouldn't bread contain quinine and iron tonic, or measles preventer, anti-flu concoction, certain hydrogen concentrations warranted to prevent the consumer developing kleptomania? Certainly the idea could be developed; but we must never forget that bread is—well, bread. That's all. What a lot, too!

### *Bad Laws Retard Progress*

"The development of perfection in bread production has been handicapped in this country by a stupid law that insists that weight shall be the measure of its excellence; at least, that is what the law has accomplished, and it has suppressed original ideas and enterprise in improving what has been called the staff of life. Times change, but our bread laws don't, excepting for the worse; therefore it is that an idea for the addition of something that would make bread a better food is strangled before it is born. Because bread is universally used by the masses as food, anything that would improve its food value, anything that would improve the balance of life-giving substances in bread, is in the best interests of mankind; and it is along these lines that the perfect loaf will develop. I read the other day of the work of a scientific

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baker, one who puts his science into everyday practice, and his ideas are to add to bread some of the things it lacks. It is well known that vitamins are an important matter in nutrition. Some people are doubtful about the very existence of vitamins, but I think it may be conceded that there are certainly some things in nutrition not easily explained if we doubt the existence of vitamins, so we may take it that they exist.

"Luckily for the human race and for the maker of perfect bread, they exist in flour, milk, malt, butter, yeast, and so on. They may be got together in bread so that, in so far as nutrition is concerned scientifically, we can have the almost perfect loaf.

"But the perfection of the loaf depends upon much more than the mere getting together of the necessary foods containing vitamins.

### *Good Materials Well Balanced*

"A wise baker will know that the material of the perfect loaf must be perfect to begin with. It must be made of material containing real food and the ever-important vitamins; but he will also remember that he is making bread, and not a completely balanced food ration. Bread was never intended to be a complete food, but it can easily be something very good in this line all the same. When he has satisfied himself that he has got the right material, it is 'up to him,' and his duty is to ferment the gluten right and manipulate the dough so that the properly matured gluten shall be properly and fully developed.

"The making of the perfect loaf is wrapped up in that problem and the problem of balancing the nutritive value; not in mere calories, because that would be easy; but in the life-giving elements, principles, or whatever you like to call the substances or their effects that meantime we call by the name of vitamins. I hope, too, that by the time we reach this state of affairs, that the use of chemicals in flour and in bread will be restricted to these things that we know are beneficial to the human race, as well as helping towards the millennium in bread-making, and without drawing much on the imagination, this very desirable time cannot be very far off. When we reach it what a reason we shall have to shout from the housetops: 'Eat more bread!' "

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## *Makers of Bread*

By Lexie Dean Robertson

I think God loves the people who bake bread:
Quiet wives in kitchens where upon the window sill
Come hungry robins asking to be fed;
Slim brown-skinned women, who with rhythmed ease
Turn coarse flat cakes before a smoky fire,
Tending the ancient rites on bended knees;
And men who work where hurried wheels are run
All day and night to make the wholesome loaves
Cream-white and crusty when the rows are done;
And mothers everywhere who spend long days
At doing simple homely tasks to keep
The home love bright and shining down dark ways.
"Take this and eat," it was, that Jesus said,
And whether hungry hearts or bodies may be fed,
I know that God must love the makers of the bread.

—From The Northwestern Miller and American Baker, March.

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For bread do soldiers lose their heads in the battlefield. For bread doth the musician sing night and day.

—Indian Proverb.

# Books for the Baking Laboratory

INDUSTRIAL FERMENTATIONS, by Paul W. Allen, M.S. Ph.D.. Professor of Bacteriology and Head of Department, University of Tennessee, 424 pp. Chemical Catalog Co., Inc., New York, 1926.

The object of this book is to present information on the application of microorganisms to industry, especially in relation to economical advantages for the improvement of products and processes, and the creation of new products of commercial value.

The field covered by Industrial Fermentations is an exceedingly wide one, as it includes many of the food industries, the soil problems of the farmer, the manufacture of organic chemicals such as alcohol, glycerine, acetone, and organic acids, and many other subjects which the author has treated in thirty-one chapters. Each chapter is followed by references.

The chapter devoted to the problem of breadmaking, pages 128 to 167, is not especially commendable in the light of recent work on this subject, and is of little value to the student who has access to the journals and other literature. Since Industrial Fermentations is supposed to deal with the applications of microorganisms to industry it is rather a disappointment to find that Prof. Allen has not given us any special information on the problems of yeast and bacteria in breadmaking except most superficially. On the contrary we find considerable space devoted to wheat substitutes and other matters which are not exactly of interest in their mycological relations. This chapter could be greatly strengthened by revision and the elimination of considerable material of little significance.

The chapter on bread yeast manufacture is more to the purpose than the one on breadmaking, but even here the inquiring student will find little information that cannot be obtained elsewhere.

C. B. Morison.

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THE NORMAL DIET, by W. D. Sansum, M.S.M.D., Director of the Potter Mettabolic Clinic, Department of Metabolism, Santa Barbara Cottage Hospital, Santa Barbara, California. C. V. Mosby Co., St. Louis, 1925.

This is an interesting little book of 72 pages, based on the author's lectures to "patients suffering from various nutritional disorders." It treats of the energy, protein, mineral, roughage, water, and vitamin requirements of the body, not forgetting a chapter on acidosis, a problem with which the author appears to be somewhat more than ordinarily concerned.

It is rather difficult for any one to state exactly what a normal diet is, since nutrition is not static and new facts and ideas about foods and diets are being constantly brought out by investigators.

As Prof. Mendel has recently said, "Notwithstanding the great advances which recent years have witnessed in the science of nutrition almost innumerable problems still confront the critical investigator. The fundamental chemistry of the nutritive processes is scarcely understood in a single detail. The energetics of the organism have as yet been sketched in broadest outlines only. Although the significance of the 'little things' in nutrition is becoming better appreciated their function is by no means explained. Instinct is not always an unerring guide in the selection of food. Although it may lead along the paths of nutritive safety under the unhampered conditions of nature, it has been found undependable in more than one instance where the food choices of the highly artificial civilized world are concerned. In any event the history of science should warn us against the dangers of dogmatism in the presence of so much that remains unknown or unexplained or unapproachable. Particularly when experience and science seem to be in conflict is it well to keep an open mind. Noblesse oblige! It becomes the duty of those who by training or natural endowment or unique opportunity are exceptionally equipped for investigation to beware of an attitude of finality where knowledge is incomplete and deductions are at best hypotheses."

The author lays down what he terms "the seven fundamental principles that should be considered in the selection of a normal diet," that is the most "favorable diet." He appears to feel that bulk, the "balancing of the diet to prevent acidosis," the mineral and water requirements, have not been sufficiently emphasized in the discussion of normal diets, and for this reason these subjects loom large on his horizon.

Since very little is known about so-called "acidosis," and its relation to diets it is quite useless to attempt to discuss this subject with any degree of satisfaction, though if one wants to obtain Dr. Sansum's idea on it they will be found on pages 38 to 48 of the "Normal Diet."

The "Normal Diet" has been written in simple terms and should be helpful to many who are eager for nutritional information that is free from the more complex terms of physiology and biochemistry.

C. B. Morison.

## Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

**Chemistry of Bread. Some New Zealand wheat flours and fermentation.** W. L. M. Dearsley. New Zealand J. Sci. Tech. 8, 34-8 (1925).—Analysis and baking tests of 5 strains of New Zealand wheat support the conception that an ideal flour is that which possesses a high proportion of gluten and which, on doughing, will produce in its dough a pH as near 5 as possible and show that: the dough possessing the higher initial pH ferments more slowly than that with a lower one; though color is partly dependent on the fat content of the flour, the "quality" of the fermentation is the chief determining factor of color and texture of the loaf; the volume of the loaf is the outcome of its $H_2O$-absorption capacity; losses of weight in the loaf on keeping and in the dough on baking are due to loss of $H_2O$, which loss is apparently greatest, on the whole, from that loaf whose flour contains gluten of poorer quality.

A. Papineau-Coutre.

**Lactose determination in bread.** W. Schut and L. E. Den Dooren De Jong. Chem. Weekblad 22, 518-20 (1925).—The Dutch official method for the determination of milk in milk bread consists of a determination of fat. The latter, however, can be due to adulteration with butter. In a series of experiments the lactose determination by the fermentation, method of Kluyver gave reliable results. By a suitable choice of yeasts the total monoses are determined in 1 sample of the aqueous extract of bread, while in another all monoses except lactose are fermented. The difference represents the lactose. Baker's yeast does not attack lactose.

Mary Jacobsen.

**Acid- and base-forming elements in foods.** G. W. Clark. J. Biol. Chem. 65, 597-600 (1925).—Data are given on the amounts of acid- and base-forming elements in the following foods: white and Graham bread, Graham crackers, shredded wheat, rice, whole milk, cheese, canned roast beef, eggs, fresh green peas and string beans, peeled raw potatoes, tomatoes, raisins, dried apples, dried prunes, apple base jelly. The data are in the nature of a supplement to the material presented by Sherman, Forbes and others and presumably indicate the effects that different soils and climate might have upon the mineral content of the various foods. A. P. Lothrop.

**Hydrogen ions and their application to mill control.** H. E. Weaver. Cereal Chemistry 2, 209-12 (1925).—The desirability of maintaining a uniform H-ion concentration in various grades of flour led to the making of observations and recording of results for a period of more than 3 years. The change in H-ion concentration occurs on different crops and during different seasons, and does not lend itself to mill control by blending or selection. The tempering process affects the H-ion concentration of wheat but little when carried to a period of 36 hours. Longer periods of tempering might be the cause of unsound and musty flour. The tempering process offers no means of controlling H-ion concentration of mill products. The Alsop process of bleaching effects a slight increase in the H-ion concentration of a flour; Cl effects a substantial increase in H-ion concentration. The use of Agene or Novadel is without effect.

R. B.

**Effects of diastase and malt extract in dough.** F. A. Collatz and O. C. Racke. Cereal Chem. 2, 213-27 (1925).—Experimental data show that the Lintner value of a flour is not an accurate index of its converting powers in a dough. With the flour as a substrate, an accurate idea of the reducing sugars which will be formed in a dough can be obtained. When diastatic malt is added to a dough, a large amount of conversion takes place in mixing, this being evidenced by a soft, wet or sticky dough. The addition of diastatic malt extract to flours of average baking strength apparently decreases the quality of the resulting bread. Ruth Buchanan.

**Report of committee on Methods, American Association of Cereal Chemistry.** C. E. Mangels. Cereal Chem. 2, 235-51 (1925).—Chemists are requested to report 2 decimal places for moisture, 3 for ash and 2 for protein. A tolerance between 2 different laboratories of 0.3% moisture, 0.02% in ash (if same method is used) and 0.25% on protein when calculated to a uniform moisture basis is allowable. Methods for moisture should specify a definite time of heating rather than heating to constant weight and directions for cooling in a desiccator should be made more specific as to time. It is recommended that different methods of standardizing acids for Kjeldahl determination be studied collaboratively and also the viscosity of flours. The effect of time and temperature on the capacity of boric acid to fix ammonia is to be studied.

Ruth Buchanan.

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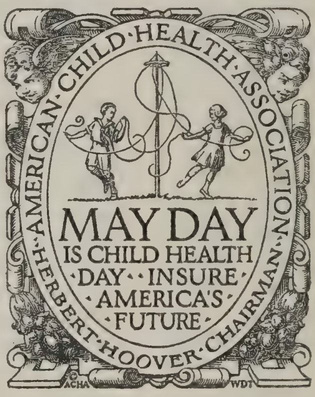
UNIVERSITY OF ILLINOIS

# Children and the Bread of Life

### *How the Baking Industry May Make May Day its Opportunity to Help Children to Health and Happiness*

MAY DAY comes but once a year. Like Christmas it should be a day of joy and happiness. And like Christmas it is of special import to the little ones. There was once a beautiful old custom which sent children into the fields to gather flowers and fill May baskets to be hung on door knobs for Mothers. Now, just as then, children bring happiness to their homes. Perhaps homes have more for children than in the olden days. There is no more love there, nor tenderness, nor watchful care. But there is a better understanding of child nature and child health.

And so in recent years May Day has been chosen as the one day of the year on which the whole country devotes its thought and energies to the building of a finer, healthier, happier childhood.



This great endeavor is directed by the American Child Health Association. In the working out of the program every child lover has his part to do; every organization its activities to direct; every industry which in any way touches the child its opportunity to contribute to the success of the annual festival.

And among all the industries none is more vitally interested in the children of today than the baker's. He feeds children and as they grow to vigorous manhood and womanhood he continues to furnish them the energy food which enables the work of the world to go on. Every malnourished child today is a doubtful asset for the future. And all the help which good bread may give to reduce malnutrition is an investment which will pay splendid dividends for years to come.

When King Solomon said, "cast thy bread upon the waters, for thou shalt find it after many days" he was more than a preacher of Jerusalem. His words are an exact expression of the value of the service which almost three thousand years later the bakers who are helping to make May Day a real day for healthy childhood are rendering mankind.

May Day is almost here. How can the baker take a part in its observance? A plan in which every baker can find a place has been outlined for him by Mrs. Aida de Acosta Root who with the help of Mrs. Walter McNab Miller is directing all May Day activities from the office of American Child Health Association at 370 Seventh Ave., New York City. This is the plan:

Make a special May Day bread with 100% milk in the formula and through educational advertising explain the need of children for a well-rounded diet, rich in milk, in fruits, in vegetables, in cereals.

Insert in bread and cake packages leaflets and other material which may be obtained at the New York headquarters which tells how to care for children.

Co-operate with the local committees who are planning May Day programs by furnishing windows for health displays and placarding wagons with child health material.

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UNIVERSITY OF ILLINOIS

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# A Splendid Heritage

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THIS is a fortunate year in which to be born. Perhaps more than in any other year since the world of conscious man began, the babies of our country are entering life with every opportunity to grow to perfect children and splendid manhood. May Day, with the finest record of sustained interest and organized effort for child health of all the May Days of the past, has gone. But the interest aroused by its nation-wide observance will continue the year around.

Through its educational systems, its playground supervision, its home welfare work, the public is giving specialized attention to the physical, mental and moral welfare of all children. And industry is aroused to the fact that in this new generation lies all hope it may have of greater success and of permanent prosperity.

Aida de Acosta Root, who as Director of the Division of Publicity and Promotion organized the May Day activities of American Child Association, has just published A New Vision For a New Generation. In this look ahead to more perfect children and all that they mean in the building of a finer race Mrs. Root has so clearly shown the possibilities for industry to cooperate with mothers and teachers in providing opportunities for the children of today and tomorrow that every baker, every producer of food, every agent in the important task of feeding the race will wish to see the picture as she sees it. And to this end we quote from her story.

On the day in the fall of 1920 when France carried her Unknown Soldier to his last resting place under the Arc de Triomphe I happened to be one of the bystanders along the line of march. It was, of course, a memorable day, when the imaginations of all who looked on were deeply stirred and highly sensitized.

Down the length of the Champs Elysees in the march of triumphant tribute passed the soldiers of every friendly nation, soldiers wearing the horizon blue of France, the khaki of English Tommies, the plaid kilts of the Scotch, even the white burnoose of the Arab. It was an interwoven panorama of the nations, linked in peace, upon the soil which so recently had been the battle-ground of nations disrupted.

Suddenly there swung into the line of march those dauntless little soldiers of the Alps, the ''Blue Devils'' as France knows them. Short, stocky, defiant beneath their tossed berets, there was, as always, something about them which could not fail to stir the imaginations of the onlookers, and there rose to greet them a shout of applause.

### *"Les Americains"*

Behind the little Blue Devils came brown figures, by contrast so tall, so broad of shoulder, that they seemed almost like giants. Word swept along the line like a strong wind, ''Les Americains,'' swelling louder to a note of triumph. ''Les Americains!''

The effect of those great stalwart figures, each one like some splendid bronze statue, was beyond one's power to describe. A tumult of shouting greeted them greater than that which had met any others, even the Blue Devils.

I have said that imaginations were keenly sensitized. Standing there in that moment of recapitulation of the war drama, with flashing clearness I saw the American against the background of the other nations. Time rolled backwards three years, and I saw, as France had, a trickling handful of American doughboys, untrained, none too well equipped, marching along the dusty, shell-pocked roads of France, and I knew why they had meant the end of the war. It was not what they did, it was what they stood for, a new hope, America!

Those shouts that rose to greet the American soldiers were the shouts of a tired people who once more had caught the contagion of power.

An old peasant woman expressed it to me later when, asked why it was she had liked the American soldier best of all, she answered, ''Oh, ze beeg American—he is so beeg, so strong.''

### *Forerunners of New America*

''Ze Beeg American!'' Bigness, strength, power, fresh hope. That is what America conveyed to the minds of the fighting nations in 1917. That is the picture which captured the old peasant woman's imagination; which aroused the tumult of shouting there on the streets of Paris. The contagion caught me. I saw those picked soldiers, each one like some vigorous Sergeant York of the mountains, with the blood of pioneers in his veins, as forerunners of what a whole generation of new Americans should be. It is a picture that must come true.

Look about at the children of this new generation growing up about us and measure them in the light of that peasant woman's tribute, ''ze beeg American,'' in the light of that shouting of the crowds. **Just how big are we?**

If we are to take our righful place in the world as the one great nation which is not depleted in human and material resources by the war, if we are to take the place which the world expects of us, we must build up a generation of children who are fit to carry on the torch of power entrusted to them. We must have a national goal of fitness and know the means by which fitness is achieved.

We must find some way to measure the bigness of our children, to rally all the forces concerned in their welfare.

### *The Need for Conscious Endeavor*

The splendid unconscious heritage which we once had in this country—of physical vigor, mental stamina, and a fearless vision—we must now restore to our children of old stock and new, through a conscious endeavor. And it should be a heritage even more impregnable, more splendid, than the original endowment.

The keynote of President Coolidge's speech on the opening of Congress this year was a plea for prosperity. He referred to prosperity, of course, in financial terms. We hear that plea on every hand. Is it not time for someone to make a plea for prosperity in human terms?

The men of brains and achievement in this country see the almost inexhaustible commercial and industrial possibilities of America and are developing them with every means they can summon to their aid. What would happen if the thinking, acting women of this country, who correspond to the men of achievement in the world of affairs, caught the picture of a whole generation of children, fit, sound, approximately perfect; reared in a home, educated in a school, living in a community, conscious of its responsibility to give them their fullest chance? If their imaginations were so fired by that picture that they mustered their forces to this great objective—no conceivable accomplishment of industry, of politics, or finance, no revolutionary discovery of science, could do so much to make America a great force in world progress.

### *A Nation Perfected for Peace*

No nation has ever yet visualized free and perfect childhood. Germany built a race perfected for war—and we know the power of that ideal, false though it was. We want a nation perfected for peace; and we have yet to test the power of that vision.

It is time to turn from the negative idea in our protection of children, to see with the sweeping clarity of the positive, taking in all children, not merely the handicapped; seeing them with that unqualified vision of the old peasant woman of France, as "ze beeg American," perfect, undaunted.

With this visioned child, each group is asked to go forth through the next twelve months, beginning with the New Year of childhood, May 1st, and to test their accomplishments for children in the light of that child.

Playground associations will ask themselves if they are contributing play places with the best possible equipment, the most inspiring leaders to help develop this perfect child. Clinics and child welfare stations will search for the perfect child and will focus all their efforts towards making all children approach that ideal. The school will ask: Is it adapting its rooms, its program, to the hope of that perfect child? Is the school lunch helping to build the body of the perfect child? The individual parent will examine into the home nursery, the home atmosphere and environment—is it worthy in every detail, so far as it is possible to make it, of that perfect child?

### *Building the Perfect Child*

Science has not yet told us in actual terms what is a perfect child. It is preparing to give us measurements, but science is slow. We have to build that child first out of our hopes and our dreams, to throw it upon the screen of the national consciousness and then to equip our machinery to fit the vision.

That perfect child must become an actual picture in our minds. Can you not see him—her—playing, head tossed back to the kiss of wind and sun, laughing, vibrant with health in every limb, free in every move, tingling with vitality, aglow with joy, winged with tireless strength?

Thus for the first time we have a central figure in all the scattered efforts for children, the unformulated hopes which are abroad through the country. In this new vision we give over the leadership into the hands of the child, where it belongs. We follow in his wake, each of us humbly doing his share to measure up to that leadership.

The freedom, the infinite resources, the vital energies of a pioneer ancestry with which this country is endowed, all call to us to play a new part in the destiny of the world. So far we have recognized that destiny largely in material terms and men have interpreted it. Our hope now is to translate it into human terms, with women and men as the interpreters. We must give to our children an inheritance of strong bodies, sound minds, clean and clear emotions—the hope of perfection—and lay in their hands the lighted torch.

It is a challenge of immeasurable scope. Shall we fail to fulfill it?

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A copy of your journal Baking Technology has come to my desk, and I would like to congratulate you on both its manner and its matter.

It seems to me that this magazine fills a very valuable place in the baking industry.

—**Edward L. Bernays.**

## *A Bakery Co-operating with the Medical Profession*

EVERY bakery should work in close cooperation with doctors and dentists and every agency which protects and preserves the public health.

Good health depends far more on keeping well than in getting well and good food is the best prescription ever written. When diseases make special foods necessary bakers have a real opportunity to help the doctor with special breads for treating abnormal conditions. An interesting folder which has come to our attention describes the breads prepared by Jules Junker of Philadelphia. The Weekly Roster and Medical Digest speak approvingly of the co-operation this baker gives the medical profession and describes some of the breads which are made for the sick. The Junker Whole Wheat Bread is approved as a superior loaf for producing laxative effects containing as it does all the protein and phosphates of lime and potassium of the wheat berry as well as its bran.

### *Bread for Diabetics*

Diabetics who are compelled to take a limited sugar and starch ration are provided with a gluten bread which is high in protein and low in starch, and with casein bread and cookies which are wholly free from starch and sugar. A saltless bread is also made for patients who are restricted to a salt-free diet. Such special breads as these, carefully made and used under the supervision of the physician, are safe and splendid remedies. The baker who can develop a variety of these breads will win the favor of the medical profession and render a real service.

Special formulas for the preparation of diabetic breads, breads of low starch content and breads high in crude fiber and active in laxative effects are available at American Institute of Baking.

## *Six-meal Days at Oxford*

THE old idea that meal time was a function of the calendar, like the tides, the rising sun and the full moon, is fast disappearing. Children get their mug of milk at morning recess and a slice of bread and butter when they reach home in the afternoon, and Sir Charles Higham is here in our midst with a very definite idea that it would be a splendid thing for the American workingman to slow down for a cup of tea at four o'clock. Indeed the Fourth Meal at Four campaign which started on the Pacific coast is travelling eastward so rapidly that the children who are now learning more in the primary grades because they are being better fed will have acquired a full legal right to rush into the pantry as soon as they get home by the time they are in grammar school.

Those mothers who still think that stomachs automatically open to receive food at seven, twelve and six o'clock and that food at any other time, at least for the children, is a physiological crime, would have a most upsetting experience if they visited Oxford University.

A recent visitor to that ancient college found the formula of living there very different from our own. There are six opportunities for eating, for instance, and the students eat "an enormous amount of food, but the English are so energetic they could not do with less." Breakfast consists usually of porridge, fish, bacon, toast, quantities of marmalade and tea—much different from the roll and coffee in France. Eleven o'clock is the time for coffee and wafers. This custom started in the war period. It is much frowned on by the authorities, for it breaks into a morning's work. There are inviting coffee shops that have real American jazz, which induces one to linger. One o'clock is the lunch hour, then at 4 o'clock the English tea, 7 o'clock dinner, and a hot drink, usually cocoa, between 10 and 12 p. m.

## *Half-baked Nutritionalists*

"Some years ago, nutrition was under a ban. Now this word is more prominently used than any other in connection with educational work. In view of the progressive advances that have been made along the line of nutrition, and therefore the popularity of the word, many half-baked nutritionalists have hung out signs and spread a lot of what they call propaganda—what I call faddism. There are many who rail against meat and who recommend all kind of roughages and everything else that is not good for the human system. Dr. Alvarez truly said, 'the reason why most people like bran is because it is the most indigestible product the Lord ever made.' If we had the stomach of the cow, the case would be different. There are too many ignorant, ill advised faddists, quasi-pseudo scientists and propagandists, discussing the subject of nutrition."

—**M. E. Jaffa, Director,**
**California State Board of Health.**

## *Cheesemaker Walks Nine Miles Through Drifts to Get Bread*

A loaf of bread was the object of a nine-mile walk recently by Louis Sager, cheesemaker at the Benkert Bros. Cheese Factory, through the deep drifts which were impassable to automobiles and some teams.

The Sager family were in need of bread and rather than borrow it from neighbors, Mr. Sager started out from the cheese factory, four and one-half miles west of Monroe, for this city.

It took him about an hour to get here late in the afternoon after wading through drifts as high as four feet. After purchasing groceries Mr. Sager started for his home again. The return trip required about two hours.

And the Sager's had baker's bread for dinner.

—**Monroe, Wis., Times.**

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

H. E. BARNARD, Editor

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MAY 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

## *News*

TODAY it is politics; yesterday it was the stock market; to-morrow it may be a murder.

The word "News" is made from the first letters of the four points of the compass—North, East, West and South, and represents information that comes in from all points. It is not always information, sometimes it is misinformation; but to be news it must always be interesting. It must have an appeal or a thrill that will momentarily grip the attention or stir the imagination of the reader or hearer.

"Have you heard the latest? What's new?"—is a daily question on the tongues of millions of people; and how inconsequential much of this news is. Generally it is unimportant in doing a successful day's work.

"Attend to your knitting" is grandmother's advice to the children, who miss stitches craning their necks watching someone else. This advice is based on the fundamental principle—"if you stick to your job, it will stick to you."

In these days of changing conditions, bakers will do well to devote more time and attention to their own business and less to "news." Be a day behind in the "news of the day," but a day ahead in your own business. Ignore what the other fellow is doing but be sure you are doing something worth while for your customer, the public.

Bakers who depend on the American Bakers Association, Baking Technology and American Institute of Baking for their "News" are successful bakers.

L. J. SCHUMAKER,
*President, American Bakers Association.*

## *Building America*

OUR comfort, happiness and progress as a people is assured by the application of basic truths uncovered in the pure research laboratory.

It is no longer thought a useless adventure to question the mysteries of nature and then to seek the answer in the realm of pure science.

Even if the fact when determined does not seem to have any direct application to agriculture, medicine or nutrition it need only wait the hour when it becomes of fundamental importance.

When Faraday discovered the principles of electrical induction he had no use for his new knowledge. But the electrical industry of today with its estimated value of fifty billions of dollars owes its development to the patient work of Faraday when in the opinion of his friends, he was wasting his time on foolishness. While the United States has done much to encourage pure science it has not appreciated its value so fully as other countries. And the amazing development of applied science has drained the laboratories of our universities of their best men. This withdrawal of workers in the fields of pure science has given our industries a temporary advantage but it is drying the springs of knowledge at their source and destroying the educational foundations on which the hope of the future must rest.

Secretary of Commerce, Hoover, whose mind has grasped so effectively the relationship between pure and applied science, has set about the task of persuading American industrial corporations to provide a fund of $20,000,000 for encouraging pure scientific research. It is planned to disburse $2,000,000 annually for ten years, to be used mainly in college and university laboratories. This would enable scientists especially qualified for research work to devote all their time to the calling.

What has been undertaken is a project directly related to national life. The plan that has been outlined deserves the designation of economic statesmanship.

---

# *The Laws of Business Conduct*

A GROUP of children were busy playing on the beach one summer evening where the overflow from a fountain ran down the sand in a tiny rivulet. Time after time, with childish patience, they built up a barrier of sand, impounding what in their imagination, was a little lake.

Always it broke thru and rippled along its appointed course to lower levels, leaving a breach in the sandy walls to be built up again.

So, unconsciously perhaps, the childish impressions are gathered into a knowledge of natural laws and the futility of obstructing them.

With advancing age the individual learns instead to direct these forces for his pleasure, and later for his profit.

The irrigating engineer has learned well the lesson of harnessing natural power so that thousands of acres of otherwise barren land are made to yield bountifully for the benefit of mankind, or to generate the power, light, and heat for industry.

The natural laws of business conduct are no less certain altho they have become a part of human experience at a much later period in social history.

There are still too many men in business who remain in the class of the young impressionist. Friendliness and confidence in the lodge room, in the church, or possibly in the civic clubs, in Rotary, Kiwanis, or Lions, are taken for granted, are recognized as natural laws of social recreation and pleasure, but these same rules of successful conduct have not been carried into business contacts, have not been harnessed for a yield of business success. Instead of co-operation carried into the business association, the local, state, or finally the National Trade Association, the time is spent in uselessly trying to thwart the rise of a deserving competitor.

Wise men do not waste time in attempting to dam the flow of business progress for their industry. They have learned that to do so only roils the stream, stirs up muddiest depths of anger and envy, and temporarily slows the stream until it again breaks thru the walls of sand with greater force.

And so the man, the business house, or the trade association, founded on right principles, directing the natural forces of its industry into channels of profitable service, goes on unperturbed, secure in the knowledge of its power.

The greatest satisfaction in business success comes to those members of American Bakers Association who help direct the forces of that great industry into the right channels, and who draw upon its enormous supply of influence and power. L. A. R.

# Sixteen Sound Suggestions

## Part II

### *Bakers May Increase the Consumption of Their Products*

MUCH of the effort to increase the use of bakers' products has been generalized into brand advertising. The desire to use bread or cake has not been stimulated by educational campaigns. Even the window displays of retail bakeries have made their appeal to the appetite purely physical. Cakes have been sold because they looked good and without any effort on the part of the baker to justify their use because of their high food value and desirability as a sweet energy food.

In the April issue of Baking Technology nine ways were described by which our modern knowledge of nutrition might be profitably used in stimulating an increased consumption of baked products. The first suggestion was an elimination of the small units in bread sizes and the standardization of bakery practice on a large loaf. Another suggestion was that bread quality should be improved in order that the loaf would cut more easily and hold its quality longer and the slices might be easier to butter and to toast. Other valuable suggestions were increasing the use of milk to meet the requirements for a more complete and helpful food; placing toast on every breakfast table as an improved breakfast food; establishing an afternoon lunch as a usual custom for children, and giving the role of bread a more important place in the evening meal.

Seven additional practical methods for increasing the consumption of baked products are briefly outlined as follows:

*10. Re-establish bread, pie and cake for the luncheon package and dinner pail use.*

Two things have to a very considerable degree eliminated the dinner pail which was once the constant companion of the laboring man. The first is the development of the automobile which has made it possible for almost every one to leave his work and drive to a restaurant for a hot meal. The other is the practice now generally in vogue in factories and plants where large numbers of employes work, of operating cafeterias and lunch rooms for the use of workers. And yet there are many sound reasons for the continued use of the dinner pail. It insures a proper supply of nutritious food and it furnishes a cheaper meal than can ever be obtained at a restaurant or lunch room.

Bakers' products are the basic dinner pail foods. Slices of bread and butter enclosing meat in sandwich form cannot be excelled as energy foods. Cake, cookies and pies are practical ways of giving variety to the luncheon. Bread advertising which stresses the value of baked goods for the builders of industry, the steel workers, carpenters, masons, is a splendid form of educational advertising.

*11. School display posters and demonstrations which teach the health value of baked goods.*

The life of the child is today centered more definitely in his school than ever before. He is educated in the school room; his games are directed by teachers; his social and civic activities are organized as troups of boy scouts and campfire girls. The condition of his teeth and eyes is determined by the school doctors, dentists and nurses. The school is supervising and indeed, in many cases supplying a considerable part of the children's food. All of these educational activities are important. They are all helping to build a more useful and healthier citizenship.

The baker, however, has as yet failed almost completely to make use of the school as an opportunity for stressing the importance of the cereal foods in nutrition. The dairy industry has on the contrary largely increased the consumption of its products by its educational campaigns among school children. No teacher in the lower school grades has been allowed to remain uniformed as to the need of children drinking at least a pint of milk each day. The same methods should be used by the baker to educate every child as to the need of a larger use of bread and cake and pie.

*12. Demonstrate the value of baked products in relation to other foods in food and health shows.*

The same methods used in educating the child in the school room can be employed in teaching adults the value of bread in relation to other foods. The adult population learns by seeing, and many opportunities are presented every baker during the year by which he can make an intelligent presentation to the public of the role his products play in feeding the world. No health show or educational demonstration should be staged in which the baker does not take an important part.

*13. Prepare booklets and information for:*

*a. Professional and public health teachers.*

*b. Lay women and club groups.*

Much nutritional information is faulty. The science of food is so new that doctors and dentists, nurses and dietitians who do not read every late contribution on the subject of nutrition are out of touch with the facts. The role of food as it was taught in the medical and dental schools only five years ago is out of date, both because the "newer knowledge of nutrition" is so new that it is not yet appreciated except by a small group of workers, and as well because very rapid advances are taking place in the production and distribution of food.

Bread which might have been justly condemned five years ago as an inadequate food is a different bread today. Pies and cakes are changing their character as rapidly as bread. The only way up to date information as to the nutritive qualities of baker products can be assured is by educating the educators, and this is a matter for the baking industry to discuss in all seriousness. The baker is in no position to tell his physician that his nutritional advice is unsound. That is a matter which can best be handled through American Institute of Baking and the publications of its Department of Nutritional Education.

*14. Establish the value of baked goods for use at social functions.*

Cakes and pastries fill first place at teas and luncheons. Special sandwiches are always in vogue. A larger use of bread is entirely practical and the thoughtful baker will find many ways to stimulate an interest in his products at social functions. In some bakeries this work is left to the Director of Home Service who is usually a woman trained in the field of home economics and who also is fitted for a position as a contact maker between the baker and groups of women.

*15. Evening refreshments and midnight suppers.*

Cake and ice cream has become the standardized refreshment service and yet there are many other ways in which bakers' products can be successfully used. Well buttered toast, made in sandwiches, is used as a serviette for rarebits and creamed dishes. It is a practical way in which to popularize the larger use of bread.

*16. Public service and "come out of the kitchen" publicity.*

Gas and electric public utilities are changing the character of house work. They are reconstructing the work of women in the home. Their greatest asset in an educational way is the freedom the use of the electric current and gas range gives the woman worker. It is just as practical to suggest that women abandon bread and cake baking that they may have more leisure for other important duties as it is to suggest that they may save time and effort by using a vacuum cleaner instead of a broom or gas instead of coal in the kitchen. The public utility companies are eager to co-operate with the baking industry in its campaigns to increase the consumption of toast through the use of gas and electric toasters. In many other ways their service can be depended upon in the promotion of the larger use of baked goods.

### *Increased Consumption Is the Important Thing*

The business man measures his success, not by his ability to hold his own in his particular line but by the upward curve of his business increase. The baker who secures a temporary advantage over his competitor by strenuous and expensive advertising campaigns should not foolishly think he has gained an advantage which he can continue to hold for when the competitor in his turn persuades his bankers to furnish him the money for increasing sales by advertising, his early advantage is lost. The baking industry can never build a larger use of its products except by intelligent effort toward educating the consumer to use larger quantities of all baked goods. Brand advertising has its place but the only permanent increase in the use of baked goods must follow the adoption of definite methods for educating the consumer as to the reasons why and the methods by which he can better serve himself by a larger use of baked goods.

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## *"Foodless" Food for Fat Folk*

SLENDERIZING at the expense of health and vigor is less common than a year ago but the beauty columns are still filled with bad advice and hospitals for neurotics overfilled with women who dieted themselves into a chronic state of nerves and malnutrition. Fortunately the funny bone of most people is close to the surface and of late it has often been hit by clever digs at the foolish fashion which has popularized famine.

A writer in a recent number of Collier's Weekly told how he sat through a six course "foodless" dinner, and then under the urge of either malice or subtle humor he wrote down the processes by which his dinner had been prepared.

He ate beets and spinach which had been boiled in three waters until there was nothing left of them but "filler", and bran wafers made from bran deprived of its nutriment by putting it in a cloth bag tied over the end of a hot water faucet and kneading until nothing remained but the cellulose, and shaped into form with a mucilage made of India gum. The salad dressings were made from mineral oil mixed with vinegar and paprika. The dessert was agar agar sweetened with saccharin. After such a dinner we may reasonably suppose that he filled the gasoline tank of his car with water and drove home to stoke his furnace with ashes.

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"I shall be very happy to receive Baking Technology. My job is that of teaching children and anything that helps a child grow is of great interest to me."

—**Angelo Patri, New York.**

# Foreign Substances in Food

## *Most Claims for Damages Because of Injuries Are Fraudulent*

SOME years ago a manufacturer of baked beans got his labels mixed and a can of pork and beans intended for some New Englander transplanted from the pie belt to the beanless plains of the west found its way to a dinner table at which the hostess was proudly doing her best to satisfy the hunger of the rabbi of her synagogue.

The beans were excellent, but the pork —Oi, Oi.

And when the packer of the beans which should have been kosher but were not, had his labels straightened out all the season's profits on that line had been burned on the altar of propitiation.

No doubt the rabbi had good reason to expect a man who got his labels mixed to pay up and handsomely at that but most cases in which food manufacturers are called upon to settle claims for damages because their product contains a foreign ingredient which caused illness or suffering are plain cases of blackmail or fraud.

### *Protective Organizations Necessary*

An organization known as the Alliance Against Food Frauds is busy checking the increasing number of claims being made against bakers, packers of food products, bottlers and confectioners, based on the alleged defects in quality or the presence of foreign substances in their products.

Walter Engles, counsel for the Alliance, discussing the subject of fraudulent food claims before the New York wholesale grocers, said in part:

"It is getting to be a very popular indoor sport for consumers to make claim upon reputable manufacturers, alleging all sorts of illnesses and nervous conditions arising from the shock and the injuries which they claim to have experienced owing to the presence of a piece of glass, or a cockroach, or a splinter of wood, or a nail, or a whatnot. In fact our chief investigator states that some day he expects some one will claim to have found a horse and wagon in a bottle of milk.

"It is the dishonest claims, made by those who never have had the accident which they claim, or who never suffered the injury which they claim, which should be weeded out and discouraged. From my experience and observation, and aside from those cases where there is deliberate fraud throughout the entire claim, I am satisfied that in a large majority of cases some condition is found that might be justly criticized. For instance, it may be that a splinter of wood will occasionally get in a loaf of bread, or that a piece of solder may be found in a can of peas.

"Undoubtedly many times foreign substances get into the food after the can is opened. Sometimes these are discovered in the course of consuming the food, but often they are not discovered until the food has been entirely consumed. Upon finding such substance, however, the finder immediately conceives the idea that because he has found something of that kind the manufacturer should pay, and pay real money. There is a peculiar psychology connected with this situation. Such claimants realize, however, that unless they claim to have suffered injury there is no basis for recovery. Therefore, they immediately begin to exaggerate their condition. They claim all sorts of cuts, aches and pains which never existed, and very often they even get their physicians, who, of course, know nothing about the occurrence except what they are told, to verify the alleged claim.

### *Defendants Fear Publicity*

"This exaggeration and the threat of publicity leads the claimants to make very large demands, and very often it is impossible to deal with them at all.

"It is only, however, by resisting these claims when they are made by the claimants themselves, after investigation discloses them that there is no just foundation for them, that claims of this kind can be discouraged. Of course, the most effective way of discouraging these claims is to stand absolutely pat and to refuse to pay them at all even after suit is brought, and even though it is necessary to go to trial. Many companies, however, as a business proposition, think it better to make settlements for what is known as the "nuisance value" of these cases, rather than go through the annoyance and expense I have outlined. Of course, settlement of unfounded claims of this kind is fundamentally wrong. Actual money should only be paid as a last resort, because every settlement made is a potential breeder of additional claims.

"Many companies carry insurance against claims of this kind, but insurance is also wrong for two reasons. First, insurance companies naturally are indifferent to defeating claims of this type, because the increase of such claims means an increase in their premiums, and because an accumulation of such claims means an increase in the business they do. Furthermore, under the law, every insurance company, when a claim is made, must set up a certain reserve against that claim. In order to release this reserve, it is a common practice to settle the cases at a small figure in order to put the reserve back into circulation.

### *How the Alliance Works*

When a claim is made against a client a full account of all of the features of the claim is filed in a rapidly expanding card index. The records are then checked over and we ascertain whether or not the same claimant has made claim against other companies; whether the doctor has been involved in a number of other claims; whether the lawyer has made claim or brought suit against a number of companies, and whether the retailer has been unduly active in claims of this type. A report is mailed promptly to the subscriber, giving a full account of what our records show, and in addition, giving the standing of the doctor and the lawyer, if there is either or both in the case. The cards are then filed for future reference in checking new cards which come in.

"We also have a geographical index, on which we list all the claims coming from a given address, or from a given city or town. We have found that many times one claim is made against one company and shortly thereafter another claim, by an entirely different claimant, is made against the same or another company, but that they both come from the same address. Sometimes a third claim is made from the same address. Sometimes the same attorney acts for both, or the same doctor. The inference to be drawn from that situation is obvious, namely, that word has been passed from one apartment to the other the "easy money" can be obtained through these claims.

"Many times the same claimant makes claims against different companies. Often the same doctor is involved in several claims. And the same lawyer is involved in several claims. We have also had instances where the same doctor and the same lawyer acted for several claimants. Of course, the inference to be drawn from this is apparent. While these coincidences do not necessarily show fraud, they do warn the packer and the manufacturer to be on guard where such situations are disclosed, and in most of the cases the claims can be entirely defeated and ignored through the information obtained."

## EXAMPLES OF BAKERY COSTS AND PROFITS IN 1925

*As prepared for Baking Technology from Eight Bakeries, each using less than 25,000 Barrels of Flour Per Year by John C. McAlpine, Member American Institute of Accountants, of 1411 Walnut Street, Philadelphia, Pa.*

| Plant No. | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 |
|---|---|---|---|---|---|---|---|---|
| Flour Used Bbls. 1925 | 23,473 | 6,609 | 8,728 | 20,619 | 31,144 | 11,240 | 9,949½ | 5,515 |
| Costs: | | | | | | | | |
| Flour | $ 8.65 | $ 8.89 | $ 8.49 | $ 8.44 | $ 9.29 | $ 8.06 | $ 8.50 | $ 8.78 |
| Other Materials | 2.55 | 2.49 | 2.16 | 2.53 | 2.49 | 3.23 | 2.56 | 3.24 |
| Bakers Wages | 1.50 | 1.63 | 1.42 | 2.21 | 1.61 | 2.19 | 2.15 | 1.98 |
| Operating Repairs, Fuel, Light and Power | 1.86 | .93 | .78 | 1.35 | 2.16 | 1.20 | 1.31 | 1.45 |
| Wrapping and Packing | .46 | .51 | .75 | .57 | 1.04 | .89 | .84 | 1.17 |
| Horse, Wagon and Auto Exp. | 1.25 | .98 | 1.31 | 1.25 | .15 | 1.15 | 2.15 | .53 |
| Drivers and Route Men | 1.37 | 1.42 | 2.19 | 2.16 | .... | 1.72 | 3.41 | 1.20 |
| Delivery and Shipping | 1.04 | .76 | .18 | .17 | .31 | .67 | .44 | .78 |
| Advertising | .46 | .12 | .13 | .96 | .36 | .10 | .10 | .26 |
| Managers | .94 | 1.51 | .97 | .50 | 1.31 | .90 | .45 | 1.07 |
| Office Expense | .61 | .61 | .23 | .51 | .42 | .31 | .30 | .39 |
| Interest, Taxes and Insurance | .31 | .38 | .44 | .46 | .37 | .46 | .13 | .23 |
| Bad Debts | .07 | .... | .11 | .13 | .... | .03 | .29 | .... |
| Depreciation (all Departments) | .32 | .86 | 1.04 | .53 | .43 | .39 | .89 | .69 |
| Total Cost* | $21.39 | $21.09 | $20.20 | $21.77 | $19.94 | $21.30 | $23.52 | $21.77 |
| Profit per Bbl. | 1.10 | .30 | 1.14 | .30 | 2.36 | 1.77 | 1.71 | 2.09 |
| Selling Price per Bbl. | $22.49 | $21.39 | $21.34 | $22.07 | $22.30 | $23.07 | $25.23 | $23.86 |

### COSTS ON PERCENTAGE OF SALES

| | % | % | % | % | % | % | % | % |
|---|---|---|---|---|---|---|---|---|
| Materials | 49.79 | 53.19 | 49.91 | 54.04 | 52.89 | 51.08 | 44.36 | 50.36 |
| Manufacturing | 17.00 | 14.33 | 13.79 | 16.37 | 21.53 | 18.51 | 19.42 | 19.29 |
| Selling and Delivery | 18.33 | 15.00 | 17.84 | 18.59 | 3.72 | 14.67 | 22.45 | 12.60 |
| Administration and Depreciation | 9.99 | 16.07 | 13.08 | 8.83 | 11.25 | 9.03 | 7.49 | 8.97 |
| Total Cost | 95.11 | 98.59 | 94.62 | 97.83 | 89.39 | 93.29 | 93.72 | 91.22 |
| Profit | 4.89 | 1.41 | 5.38 | 2.17 | 10.61 | 6.71 | 6.28 | 8.78 |
| Sales | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

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* No interest on investment taken—all depreciations in one item. No income tax included.

# Gasolines Vary in Quality

## *How to Test and Buy Them Profitably*

By W. C. Luckow

GASOLINE has become our most important motor fuel and a necessity of modern life. About thirty years ago when the first successful automobile was developed, there was a limited market for gasoline, but today the consumption of motor fuel in the United States has reached a very high level.

In 1924 the amount of motor fuel consumed in the United States was about 7,750,000,000 gallons and approximately one half of the total was consumed by motor trucks and other commercial vehicles, which constitute but 15 per cent of the total number of motor driven vehicles registered.

The constant and increasing demand for gasoline by the consumer has required extensive research and investigation by the manufacturer for the purpose of developing production processes to a high degree of efficiency and economy.

As a result new procedures have been devised, which have greatly increased the production of gasoline.

The important supplementary methods now used among others for this purpose are: (1) the so-called "cracking" process of heavy petroleum oil, and (2) extraction from natural gas.

In 1913 about 1,250,000,000 gallons of gasoline were produced in the United States. The yield was 12.5% of the crude oil. In 1923, 7,555,000,000 gallons of gasoline were produced. The yield was 30% of the crude oil. Of the total amount of gasoline produced in 1923, about 70% was produced by straight run distillation methods, 21% by cracking methods and 9% by the recovery of natural or casinghead gasoline.

In 1923 there were about 2,000 cracking units in operation, of which number about 1600 were operated by the Burton process.

### *Method of Production*

Gasoline is obtained either from petroleum or natural gas. Three types of gasoline are marketed, namely (1) straight refinery, (2) blended casinghead and (3) cracked and blended gasolines.

### *Straight Refinery Gasoline*

In the straight refinery process a cylindrical still is charged with the required amount of petroleum. The still is heated by a fire directly underneath it. The petroleum is distilled and the distillate collected as long as it is suitable for gasoline, after which the receivers are changed to recover other products. The liquid obtained by this first distillation is often dark colored and has a bad odor. In order to purify it, it is run into large agitators where a small amount of strong sulphuric acid is added and then the liquid is agitated with air or with a stirrer. After agitation with acid the solution is allowed to settle and the dirty black acid sludge which contains most of the impurities is drawn off. The remaining liquid is washed with water and then with a dilute solution of caustic soda and finally with water again. The washed liquid is run into another still which is heated by fire or steam and redistilled. Sometimes the gasoline is treated with "doctor" solution in order to remove sulphur compounds.

The methods of distillation and purification vary in different plants and at different times in the same plant. There is no standard point at which the distillation of the gasoline is stopped. The manufacturers set their own limits but these must be so regulated that a satisfactory product which meets trade demands and Government specifications is obtained.

### *Blended Casinghead Gasoline*

Blended casinghead gasoline is made by the compression or absorption of natural gas and this is then blended with enough heavy naphtha to produce a product with the desired characteristics. In general, the compression process consists in compressing the natural gas and then cooling it by means of condensers or by other means. The condensed gasoline is trapped off into stock tanks. Details of the process, such as pressure used, number of compressions, method of cooling, etc., vary in different plants.

The absorption method for recovering gasoline from natural gas consists in bringing the gas in contact with an absorbing medium in such a manner as to enable the absorbent to pick up the gasoline vapors.

The absorption processes are divided into two classes, those using solid absorbing materials and those using liquid absorbents. Activated charcoal and silica gel have been used as solid absorbents. When solid absorbents are used two batteries of absorbers are required. The gas is passed through one battery until the material is saturated after which it is diverted to the other battery. The gasoline is then driven off from the absorbers by means of steam and is condensed and purified. Crude oil, mineral seal oil, naphtha or low grade gasoline may be used in the other processes employing liquid absorbents. These plants are equipped with absorbing towers which are partially filled with the absorbing medium and which are equipped with baffle plates and are so operated as to allow intimate contact between the absorbing medium and the gas. The gasoline is recovered from the liquid absorbents by distillation.

### *Cracked and Blended Gasoline*

Cracked gasoline is gasoline which has been produced by a cracking process. ''Cracking'' means the breaking up of heavier compounds into lighter ones. In the Burton process and similar processes of heavy oil such as gas oil is heated under pressure in large thick walled stills to temperatures above 725° and much of the heavy oil is converted to gasoline. Several other cracking processes that differ in many minor details are also in use now but in all methods the heavy oils are cracked by subjecting them to high temperature and usually to some pressure. The gasoline is separated by a process similar to the usual straight run petroleum distillation. Cracked gasoline is generally blended with gasoline distilled directly from petroleum.

### *Properties of Gasoline*

As an automobile fuel gasoline is almost all that could be desired. Outside of its tendency to knock, it is the ideal automobile fuel. Straight run gasoline is characterized by a low content of unsaturated and aromatic hydrocarbons. It has a distillation curve of characteristic form, free from marked irregularities. Cracked gasoline is similar to straight refinery gasoline in some physical and chemical properties but differs in that it contains varying proportions of unsaturated hydrocarbons whose utility has not yet been completely determined. Blended casinghead gasoline is in general characterized by a considerable percentage of low boiling point constituents and a high end point but frequently the blending is done in a manner hard to detect.

### *Properties of a Good Gasoline*

The most important attribute of a good gasoline is a proper degree of volatility.

It must contain enough easily volatile matter to start readily in cold weather and must vaporize with sufficient ease to burn completely in the average automobile, but it must not be too volatile, otherwise there will be a high evaporation loss. Investigations have shown that under summer conditions the degree of volatility has little effect on fuel economy but that at winter temperatures a gasoline of low volatility gives a somewhat lower mileage per gallon than a more volatile fuel. Both in summer and winter the dilution of the lubricating oil increases as the volatility of the gasoline decreases. With any given gasoline the degree of dilution is higher during cold weather than during warm weather. The gasoline should not contain any considerable percentage of heavy or non-volatile constituents which cannot be completely vaporized and burned in the engine cylinders and which causes dilution of the oil in the crank case.

It should not contain any material that after combustion leaves a residue that collects in the motor.

It should be free from substances that attack metal either before or after combustion. Unremoved acid from the refining process may cause such trouble.

Neither the gasoline nor its products of combustion should have a strong disagreeable odor.

The gasoline should be free from water or sediment or other foreign material.

Properly refined gasoline should be water white.

The "knock" in an engine is a detonation combustion which manifests itself by a loud hammering sound of metallic quality and by a reduction in power.

Much investigation on remedial measures for "knocking" troubles has been carried on by various manufacturers recently and as a result of this work certain compounds have been recommended for its prevention.

### *U. S. Government Specifications for Motor Gasoline*

The United States Government specifications for motor gasoline specify:

Color.—The color should not be darker than No. 16 Saybolt.

Corrosion Test.—A clean copper strip shall not be discolored when submerged in gasoline for 3 hours at 122° F.

Distillation Range.—

| | |
|---|---|
| First drop distils below | 55° C. |
| 20% distilled below... | 105° C. |
| 50% distilled below.... | 140° C. |
| 90% distilled below... | 200° C. |
| End point below...... | 225° C. |

The recovery on distillation should be at least 95%.

Sulphur.—Sulphur should not be over 0.10%.

### *Discussion*

Since not all gasolines conform to the Government specifications and not all gasolines will behave similarly in the automobile engine, it is important for the gasoline user to know something about the product he is using.

E. W. Dean, in Department of the Interior, Technical Paper 214, Petroleum Technology 52, states that properly interpreted results of an analysis in the chemical laboratory give more reliable information concerning the utility of a grade of gasoline than anything less than the most elaborately conducted engine dynamometer tests, or the collective experience of a large number of users.

It is suggested that all users of gasoline in considerable quantities may profitably submit samples to the Service Laboratories of American Institute of Baking before making long time contracts. The savings in the use of a suitable motor fuel are quite as definite as savings at the divider or in the oven room.

# Commercial Cake in the Making

## *Superior Ingredients and Improved Methods Are Producing Commercial Cakes, Which Are Rapidly Replacing the Home-made Ones*

By Roscoe H. Shaw

*Chief, Department of Nutrition, American Institute of Baking*

THIS has been called the age of invention and we are living in the land of the inventor. Although inventive genius has been rather tardy in considering the needs of the home, in more recent years the pressure cooker, the vacuum cleaner, and a host of other labor-saving appliances have been devised which have greatly lightened the work of the housekeeper.

The house-wife has benefited not only by the inventions which are used in the home but by those in the commercial world as well. Because of better bread due to the use of modern machinery as well as to newer methods in which the chemist and nutrition worker has played a part, the house-wife now turns to the baker for her bread. Thus she is relieved of the drudgery of bread making, and the home baking of bread is fast passing. Improved machinery and improved methods in pie and cake baking are now relieving her of another arduous phase of her work. The housewife of yesterday is the home manager of today. Modern inventions and methods have taken from her much of the labor of house-keeping so that she has time for many of the pleasures and cultures of life which were denied her sister of the past generation.

### *A Modern Cake Factory*

Recently it was my pleasure to visit one of the larger cake manufactories. Will you make this visit with me? As I entered the factory I caught the pleasing aroma of flavors and spices which of course would be associated with a plant where tens of thousands of cakes are made in a single day. Our first stop was in a place used as a store room for supplies immediately needed and also where the various ingredients that go into the cake are weighed out, to be mixed a few minutes later in another room. Any visitor to the factory expecting to find substitutions and inferior ingredients, would be doomed to quick disillusionment.

My attention was first called to the four constituents which may be termed the staples for cake making—that is the sugar, the shortening, the eggs, and the flour. The sugar used was same sugar that is sold at the corner grocery. The best quality of butter was in evidence, and besides this, the other shortenings, such as lard and hardened vegetable oils found in the kitchen of any home. In the matter of butter, the commercial baker has a distinct advantage. Buying in large quantities and having cold storage facilities, he is enabled to buy his butter at its best; rich June butter when, from the flavor, color, and nutritional standpoint, it is at its height, is placed in cold storage to be held there at low temperature from the time it is churned until used. So the cake baker, the year round, has an article taken at the time of its greatest food value.

### *Frozen Eggs*

I noticed that the eggs used came from cans, and I was told that they were spring eggs which had been shelled in a plant devoted solely to that purpose, immediately frozen solid, and kept in that condition until needed. Here too, the commercial baker has the advantage over the house-wife. Eggs are at their best in

March and April. After that they lose some of the qualities desired for cake making. Most home cooks are quite well aware that the late summer or winter egg is not nearly so good for whipping as is the spring egg. Moreover, eggs from certain localities are superior to those from other localities. For example, eggs coming from the corn belt are much superior to those coming from some of the southern states. Buying in large quantities, the baker has the pick of the eggs and he selects them from the locality desired and at the proper time of the year, so in eggs also he has a product at its peak of quality, the year round. He does not have to depend on eggs that happen to be on the market at the time he uses them.

In the matter of flour too, the commercial baker has a certain advantage in that he can select the flour best adapted to cake making, while the house-wife more often uses a sort of general purpose flour which she employs for all kinds of culinary needs.

### *Some Imported Ingredients*

Enormous sacks were stacked in a corner of the room. These contained filberts imported direct from Turkey, as Turkish filberts have the best quality for cake making. Likewise the walnuts used are imported from France. The lemon oil employed for flavoring, came from Messina. The Messina lemons have the finest flavor of any produced in the world.

The ingredients are weighed out by men who are specialists in the work, placed in containers, and sent to the room below where they are mixed.

The mixing of materials is done by an entirely different crew of men than those engaged in weighing them: in fact they are in what might be termed two distinct departments. We next stopped at the room where the ingredients are mixed. This is done in powerful, rapidly moving machines which work a lightness into the mix such as is quite impossible by hand. Adjoining this room is the baking room where the cakes are cooked in enormous ovens, the bottoms of which are gigantic disks revolved by machinery at such a rate that when a given cake had completed the circle, it has been baked, and is removed to remain on a rack until cooled.

### *Icing the Cakes*

Next was to the room where the cakes receive their finishing touches in the way of dainty fillings and icings. In many respects this is the most interesting room in the factory. The workers are girls in attractive white uniforms, and it is a fascinating sight to watch them frost a cake in but a fraction of the time it would take the housewife. There is a seasonal demand for cakes as well as for pies. At the time of my visit the first breath of spring was in the air. Strawberry filling was being made that day. Fresh strawberries were used and the bright spots of red peeping through the white cream was most tempting. The girls engaged in icing the cakes are among the highest skilled in the factory. It takes a year, the foreman told me, to teach a girl this art, for art it really is. The dexterity with which they hold the cake in one hand, rapidly revolving it, while the other applies the icing with a spatula, is truly amazing. A great variety of fillings and icings were being used in this room. Butter cream icing made of pure unsalted butter and powdered sugar, seemed to be the one most used although other varieties, including the one made of white of egg and sugar, were also in evidence. The greater part of the filling and icing must be done by hand since machines have not yet been perfected which will accomplish this work.

The next step is the packing and here, because many of the cakes are fragile and easily crumbled, great care is taken. The better grades of cakes are placed on cor-

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UNIVERSITY OF ILLINOIS

rugated card board covered with wax paper. Then a sheet of buttered waxed paper is placed over the cake, and finally another waxed paper envelopes the whole. This not only insures the arrival of the cake in perfect condition, but its keeping quality as well. To show me how well a cake would keep when thus wrapped, the foreman produced a cake which was more than two weeks old. This cake had a soft feel and seemed quite fresh. Each cake as it leaves the factory bears a code number which is intelligible to the livery man. It tells him the date on which a cake is baked. Cakes are not allowed to remain on sale when they are more than a few days old. After that they are returned to the factory as stales.

### *The Cookies*

Then we went to the cookie department. Some of the cookies are molded and cut out by machinery, but the most of them, except for the mixing of the dough, are made by hand. When I was told that they make square cookies with a round cutter, I would not believe it because it seemed too much like boring a square hole with an auger. However, I saw it done and this is how it is accomplished. If round cookies are wanted, they are placed on the baking pan sufficiently far apart that they do not come in contact with each other, while baking; if square ones are desired, they are placed closer together so that as they expand in the oven, they push each other into the square shape.

On the way out we stopped in the room where they were making the familiar doughnut. Here was a long line of large kettles containing hot fat. The finished doughnut was taken out of these kettles with astonishing speed.

### *The Egg Breaking Plant*

Now I had completed my trip through this large, modern cake factory. I was nearly convinced that the materials used were of high grade. I had seen that everything was handled in a sanitary manner, but there lingered in my mind a certain doubt, and that concerned the eggs. I wanted to know just how these eggs were canned. Back in my mind I had some sort of impression that a place where eggs are broken and canned must of necessity be rather an untidy place, so I visited the plant where this is done and it was here that I received the greatest surprise of my trip.

As I entered the egg-breaking plant I noticed some cars on a siding, filled with eggs which were being unloaded. These eggs came direct from the country and started their journey within a few hours after they were laid. Expecting to find a rather untidy place I found instead a plant as clean as any housewife's kitchen I have ever seen.

The eggs first come to a room where they are candled. Any egg which fails to pass the candler, as well as those broken in shipment, are immediately discarded. Only perfect eggs, as far as they can be told at this point, go to the large, light, airy room with cement floor and tiled walls where they are broken and canned. The workers were young women clad in becoming white uniforms. I was astounded at the dexterity and cleanliness with which the egg was cut open, in about the same fashion that the housewife would do it, on the side of a pan except that here was a sort of knife held rigidly. The egg was then emptied into a small aluminum receptacle which was only large enough to hold the yolk. A small lever brought down a cover forcing the excess of whites into an aluminum cup below. Another small lever dumped the yolk into a second aluminum cup. These cups are contained in a small tray. After two or three eggs have been separated, they are inspected by the smell for mustiness. A musty egg could pass the candler. If a musty odor is noticed, then the contents of the cups are discarded, and both they and the tray are washed and sterilized before using again.

### *Every Egg Must Be Good*

After separating, the whites are poured into paraffin-lined tin cans and immediately placed in the freezing room where the temperature is always at least 5 degrees below zero. The yolks are also placed in the same kind of cans, and frozen, but before this is done they are treated in a sort of churn to break them up and make a mass of uniform consistency. Some cakes call for whole eggs, in which case of course the whites and yolks are not separated, the egg being broken and emptied into a small cup and then the whole egg treated as were the yolks in the former case.

During the whole process the inside of the egg scarcely came in contact with the hands of the operators, and it would be impossible for a bad egg to pass through. This plant is operated only during the spring and early summer when eggs are at their best, and canned eggs remain frozen solid until they are used by the baker.

I left the canning plant with a feeling that cakes as made, at least by this particular factory, contain only high grade materials of much better quality than those usually obtainable by the housewife. The cake baker has also at his disposal machines which are capable of beating the cake into a state of lightness not possible for her.

The rapidity with which the sales of bakers cakes are increasing is sufficient evidence that the housewife is convinced of their superior quality and that she is seizing the opportunity of lessening her own household work and at the same time securing an article of food welcomed on her table.

## *Heavy Meals for Boys and Girls*

''People say 'school boys are all little pigs,' but modern research gives strong evidence that the adolescent child should have more food than the adult. A boy of 16 should be given as much food as a man doing daily vigorous outdoor work, such as gardening. From 11 to 13 a girl eats more than a boy, more than her mother and actually more than her father. Scientifically, there is a lot to be said for heavy eating by children.''

This very interesting and logical statement is attributed to Professor Mottramin of Bedford College, England. He was discussing the problems of childhood when he said it. The evidence that children are underfed is accumulating rapidly and logically leads to the conclusion that after-school feeding should not be denied growing children.

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## *And This Is Home Made Pie In A. D. 2000*

Give me a spoon of oleo, Ma,
  And the sodium alkali,
For I'm going to make a pie, Mamma!
  I'm going to make a pie.
For Dad will be hungry and tired, Ma,
  And his tissues will decompose;
So give me a gram of phosphate,
  And the carbon and cellulose.
Now give me a chunk of casein, Ma,
  To shorten the thermic fat,
And give me the oxygen bottle, Ma,
  And look at the thermostat.
And if the electric oven is cold
  Just turn it on half an ohm,
For I want to have supper ready
  As soon as Dad comes home.

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The knight, in ''Don Quixote,'' wisely said: ''Since we have a good loaf let us not look for cheese-cakes.''

—**Old English Proverb.**

# The Basic Need of Industry

## *Pure Science Research Must Be Given Liberal Support*

By Dr. A. E. White
***Department of Engineering Research, University of Michigan****

THERE is no body of men more interested in the advancement of pure science than our engineers, for the engineering profession is built upon the application of scientific discovery. If we would command the advance of our material life, and to a considerable degree, of our spiritual life as well, we must maintain the earnest and organized search for truth. We could well base an appeal for a more vigorous support for research in pure science wholly upon moral and spiritual grounds; the unfolding of beauty, the aspiration to knowledge, the ever-widening penetration into the unknown, the discovery of truth, and finally, as Huxley says, "the inculcation of veracity of thought." All are ample justification for our finding dollars to keep these searchers alive. But as I am proposing to support an appeal for dollars, I propose to discuss the dollar's results as well.

Research in the biological and physical sciences takes two forms; industrial research (which is the application of science) and research in pure science. Obviously, there must first be a pure science before there can be an application. I am aware that there is a twilight zone between them, but no scientist has difficulty in finding the borders.

### *We Have Not Kept the Pace*

While we have in recent years developed our industrial research upon a scale hitherto unparalleled in history, we have by no means kept pace in the development of research in pure science.

Not only is our nation today greatly deficient in the number of men and equipment for this patient groping for the sources of fundamental truth and natural law, but the sudden growth of industrial laboratories has in itself endangered pure science research by drafting the personnel of pure science into their ranks—depleting at the same time not only our fundamental research staff, but also our university faculties, and thus to some degree drying the stream of creative men at the source. Thus applied science itself will dry up unless we maintain the sources of pure science. This is no complaint against our great industries and their fine vision of the application of science. It simply means we must strengthen the first line of our offensive. The day is gone by when we can depend very much upon consequential discovery or invention being made by the genius in the garret. A host of men, great equipment, long patient scientific experiment to build up the structure of knowledge, not stone by stone but grain by grain, is today the fundamental source of invention and discovery.

### *Our Expenditures Are Too Small*

Compared with other expenditures of far less importance to human welfare, the amount of money annually devoted in the United States to the aid of investigators and investigation in pure science is absurdly small. It is less than one-tenth of our expenditure for cosmetics. We have, indeed, some fine foundations for pure scientific research—the Carnegie Institute, the Smithsonian Institution, the Rockefeller Institution, and the many other research activities of much more limited but special endowments. The work of our Universities, together with the work of the National Research Council and our Government agencies, have shown fine accomplishment in this field. But the whole of the income available from these sources for research in pure science certainly does not exceed $10,000,000 a year—whereas in the professional schools of our universities, in technical and agricultural colleges and experiment stations, in industrial laboratories, and in our Government bureaus we probably expend today $200,000,000 a year upon applied science research.

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* An address before Michigan Canners Association.

The wealth of the country has multiplied far faster than the funds we have given for these pure science purposes. And the funds administered for it in the Nation today are but trivial compared to the vast resources that a single discovery places in our hands. Men of science know, from their own experience, how seriously scientific work has been impeded by lack of resources, and they will appreciate how great, in the aggregate, must be the resulting loss to the Nation and to the world.

### *We Must Add to Our Knowledge*

The progress of civilization, as all clear-thinking historians recognize, depends in large degree upon "the increase and diffusion of knowledge among men." It is not merely a question of applying present-day science to the development of our industries, the reduction to the cost of living, the eradication of disease and the multiplication of our harvests, or even the diffusion of knowledge. We must add to knowledge, both for the intellectual and spiritual satisfaction that comes from widening the range of human understanding, and for the direct practical utilization of these fundamental discoveries. A special study in an industrial laboratory, resulting in the improvement of some machine or process, is of great value to the world. But the discovery of a law of nature, applicable in thousands of instances and forming a permanent and ever available addition to knowledge, is a far greater advance.

Radio communication would have remained not merely impossible but wholly inconceivable except for the fundamental experiments of Faraday, the mathematical formulation of the wave theory by Maxwell, and the experimental realization of Maxwell's predictions by Hertz; successive advances in knowledge made without thought of immediate application or financial return.

### *The Einstein Theory is Not News*

No newspaper headlines noticed Becquerel's discovery of radio activity from which long after sprung the whole train of discoveries leading to radium and its vast human service. No one reads in the popular journals of the theory of the hydrogen ion. We do hear sometimes of the effect in economy and production that its understanding is having upon scores of industrial processes, but how many know the name of the scientist who has added billions in money value to the world? And I am not sure he had even a stenographer to save his time in his race in search of other laws. The rise of the Einstein theory, which has revolutionized physical science and fundamentally affected modern thought, was rendered possible by the most abstruse developments of mathematics over long terms of years, and who may say that some day it may not become the raw material of our industrial laboratories with a fine outpouring of benefits in added human comfort and convenience?

### *We Have Too Few Scientists*

If we were to survey the Nation, we should find that the technically trained men engaged in pure science research fall into two main groups; on one hand, those supported in the great pure science research institutions, and on the other, those in our universities or engaged in individual investigation. The number supported by our pure science research institutions, such as the Carnegie, Rockefeller, Smithsonian, and others probably does not exceed 500 technically trained men. Those engaged in pure science research in our universities or upon their own resources probably do not exceed 5,000, and most of these devote only part of their time to this work. And there are some men in our industrial laboratories who are engaged in pure science work. It is an interesting contrast that the scientifically trained personnel in applied science investigation today probably exceeds 30,000.

### *What the Problem Is*

The problem as I see it is to secure much larger support—

First, to our university men, in order that they may be able to give a larger proportion of their time to research, and that our universities may increase the number of men.

Second. To co-ordinated research for certain definite purposes.

Third. To the pure science research institutions.

It is on the men in independent research and in our educational institutions that the great burden of scientific advancement must always rest, and from them that the inspiration of the younger generation of oncoming scientific workers is divided. What we need above all things is the better support of these men. They should not, by the necessities of living and the cost of equipment, be forced into our industrial laboratories. Those men who show an aptitude for research should be less engulfed in teaching. Often their productivity can be greatly aided by being released from teaching and administrative demands and endowed in research positions. Much can also be done by providing them with instruments, skilled assistants, measures, computers, and stenographers, and all the aids that the nature of their researches and the most economical use of their time may demand. To attempt to herd into great laboratories, even for pure research, is often their least useful service. To alter their mode of life and thought would merely result in the exhaustion at the source of the vital essence of their success. Moreover, the very researches which they prosecute and the discoveries they achieve demand just such concentration of attention and originality of perception as their freedom tends to foster.

### *No Price is Too High*

There is no price that the world could not afford to pay to these men who have the originality of mind to carry scientific thought forward in great strides—and they wish no price. They need opportunity to live and work. No one can estimate the value to the world of an investigator like Faraday. Our whole banking community does not do the public service in a year that Faraday's discoveries do us daily. As national assets, men of his type, even when much less gifted than Faraday in the past and Millikan today, are beyond valuation, and no effort should be spared to facilitate their work. Only thus can they be reasonably expected to make the best use of their willingness to advance knowledge and therefore civilization, without thought of personal gain.

The universities in which most of them are employed are not to be blamed for this because they do maintain vital interest in research and they would be glad to devote much larger sums to its support if the pressure of other demands would permit. In seeking assistance elsewhere the investigator encounters ample good will but sadly inadequate means. We may make these academic posts so attractive to the student of science that he will seek and occupy them permanently because of the opportunities they afford him to advance knowledge by original research without anxiety for bread and family and equipment. It is true that money can not buy genius but many a genius in science has defaulted because he has had to eat.

### *Coordinated Research Needs Support*

Aside from direct support to these men there is another method of organization of research among them that is no less in need of support. That is, coordinated research in specific directions by men in different localities—again, men mostly in our universities. Some of these are broad inquiries, demanding the joint consideration of specialists from various fields of science. Others are of narrowed scope but of such character or magnitude that the combined efforts of many workers are essential for their solution. The National Research Council has organized many cooperative investigations. Such organized campaigns against the unknown are few and far between in our country, for but few men have had the vision to give them financial support. Thus, we need to find great funds which wisely directed can be used to support and stimulate the work of the many indigent investigators, the many men in our universities, the great research institutions, and to organize definite campaigns of cooperative research among them.

The third type of pure science research that requires much more liberal support is the special institution. The recent appeal of the Smithsonian Institute for additional endowment to enable it to support a larger staff, so that it may properly compass that fraction of the field of science which has been its province, should have the support of every citizen. The Smithsonian has been peculiarly the architect of scientific investigation in our country. Much of the work we have in progress today has been inspired from this great pioneer of all American research.

### *Nobel Prizes Do Not Come to Us*

It is unfortunately true that we can claim no such rank in pure science research as that which we enjoy in the field of industrial research. Instead of leading all other countries in the advancement of fundamental scientific knowledge the United States occupies a position far in the rear of the majority of European nations. A list of the awards of the Nobel prizes to men of various nationalities reveals the small proportion of first minds that we support. Other tests lead to the same conclusion, namely, that the number of first-hand investigators developed in the United States is far below what our population, education, and wealth would lead one to expect.

The difficulty we experience in securing a place in science beside the nations of Europe can hardly be due to a lack of men in innate ability, judging from the leading part already played by the United States in finance, in architecture, and in applied science. It results partly from the fact that American civilization is only beginning to emerge from the pioneering stage, and partly from the financial and other inducements which so often lead talented men reluctantly to accept well-paid industrial positions instead of poorly-paid academic and research posts.

### *Our Leaders Realize Our Needs*

The far-sighted leaders of industry fully recognize the dependence of their progress upon advances in science, and emphasize their belief that fundamental research should be much more greatly aided.

Dr. J. J. Carty said in his presidential address to the Institute of Electrical Engineers ten years ago:

"By every means in our power, therefore, let us show our appreciation of pure science, and let us forward the work of the pure scientists, for they are the advance guard of civilization. They point the way which we must follow. Let us arouse the people of our country to the wonderful possibilities of scientific discovery and to the responsibility to support it which rests upon them, and I am sure they will respond generously and effectively."

But the response has not yet come.

After many years of experience in industrial research he echoes the words of Tyndall spoken in New York in 1873:

"It would be a great thing for this land of incalculable destinies to supplement its achievements in the industrial arts by those higher investigations which our mastery over Nature and over industrial art itself has been derived."

We have prided ourselves on our practicality as a Nation. Would it not be a practical thing to do to give adequate organized financial support to pure science? And if by chance we develop a little contribution to abstract learning and knowledge, our Nation will be immensely greater for it.

## *Bread Builds Better Bones and Bodies*

"THE public was satisfied with water-made bread until shown that bread made with milk solids is better bread, with a better color, better texture, better flavor, better toasting qualities and that it builds better bodies for our children." This quotation from an address given before the Texas Bakers Association by Dr. H. E. Van Norman is a fine appreciation of the value of milk in bread baking. As President of the American Dry Milk Institute Dr. Van Norman is rightly proud of his product, dry skim milk. But all that he says of the value of milk solids in nutrition is justified by the work of the experts in this important field. The baker of bread who appreciates the opportunity given to him to build a finer, stronger race through the addition of the vital and essential ingredients of milk to his loaf will find the following discussion of milk solids of much interest.

### *Bone-building Materials*

"While most people are largely influenced in their food choice by what they like to eat because it looks good and tastes good, a tremendous effort is being made in every city in the land to so feed growing children that they will have stronger teeth, stronger bodies and better health. The dairy industry has attained an inevitable place in the public's interest in better food, so much so that thousands of schools are teaching children to drink or eat a quart of milk a day. Why is this? Because science has shown that many children are actually underfed, i. e., do not have enough of certain food materials to grow strong bodies. The commonest deficiency, Dr. Sherman, of Columbia University, tells us, is an insufficient amount of calcium and phosphates. The best source of these minerals is the food solids of milk, and practically all of the calcium and phosphates in milk are left in the skim milk when the cream is removed for butter-making.

"Drying this skim milk gives the baker a tremendous opportunity to add to his wheat bread the bone-building minerals of milk and make a loaf which he can commend to the mothers of his neighborhood as a bread that will help them grow children with stronger teeth, bones and bodies."

There are three things that the king has not: eating like us of bread with an appetite, of seeing the sun rise, and of hearing the truth.

—Old Italian Proverb.

# The Man Behind the Oven

By Sherrard Coleman

*Lieutenant Colonel, Quartermaster Corps, U. S. Army*[*]

**No finer contribution to the service of our country is being made in any department of national defense than that of the bakery companies of the Organized Reserve. Colonel Coleman, who has been largely responsible for the interest taken by bakery engineers in the organization of reserve bakery companies, discussed the National Defense Act and pointed out the opportunity for service in addressing the graduating class of the School of Baking. His fine appreciation of the role of bread in wartime and in peace merits careful reading.**

I CONGRATULATE you young men on the completion of your studies. The day you have looked forward to since you entered this Institute is at hand. You are master bakers, graduates of the American Institute of Baking—exponents of the latest research on the science and art of bread-making. You are the leaven of a great industry and from you much is expected in putting into practical use the last word in baking technology.

I am here this morning to beg your services as patriotic citizens for the cause of preparedness. Our national traditions are opposed to a large standing Army and we have to rely on our citizen soldiers for defense. For this reason, until 1920, we never had a national military policy. We have always been unprepared. Years of warfare, millions of dollars and thousands of lives might have been saved had a force of 10,000 well trained soldiers been available at the first battle of Bull Run in the Civil War. Likewise, had we been prepared for the World War we would have saved thousands of lives and billions of dollars to our people. Indeed, it has been said that there never would have been a World War if the United States had been prepared. Let us hope we have learned one lesson so well that history will not repeat itself.

The production of bread has become a most important commercial industry. It is the staff of life of the soldier as well as that of the citizen. It is one of the things that we have to be prepared for to meet an emergency.

The National Defense Act of 1920 provides that the Army of the United States shall consist of three parts—the Regular Army, the National Guard and the Organized Reserve. The peace-time strength of the Regular Army and the National Guard is about one-fifth of what it is at war strength. The Organized Reserve is entirely a skeleton organization consisting usually of the commissioned personnel only. Sometimes a small enlisted training cadre is provided for, which usually consists of the first sergeant, supply sergeant, company clerk, etc. With a bakery company there should be, in addition to the company officers, a chief baker, a supply sergeant and the personnel necessary to take care of such equipment as might have been issued by the Federal Government for training purposes.

The territory of the United States is divided up into nine Corps Areas, according to the population. Chicago is located in the Sixth Corps Area, which consists of the three states of Michigan, Wisconsin and Illinois. There are 126 bakery companies assigned to different places throughout the United States. Nine already have been allocated to the Sixth Corps Area, six of which are located in Chicago. These bakery companies are usually located in accordance with the population, that is, in cities of considerable size, for the reason that commercial bakeries are expected to furnish the nucleus of the personnel required. The general plan provided for is to select the commissioned officers from the production managers of the baking industry, who would be able to organize their companies largely from the personnel under their control. In other words, as far as it is practicable to do so, it is proposed to secure the enlisted personnel from the employees of commercial bakeries and the commissioned personnel from its management.

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[*] An address to the Graduating Class of American Institute of Baking, April 24, 1926.

A bakery company consists of a captain, one first and one second lieutenant and 85 enlisted men, divided into 12 units, each unit being provided with sufficient personnel to operate one field oven and its equipment. A bakery company is a complete organization, so far as taking care of itself. It is non-combatant in character and is armed only with the pistol for self-defense. The duty of the company is to bake the bread which the quartermaster issues as a part of the soldier's ration. A bakery company forms no part of the tactical strength of a division, but usually accompanies a division for the purpose of supplying it with bread.

The company commander is responsible for the proper clothing, subsistance and shelter of its company. He is also responsible for the production of the bread he is required to turn out. In other words, a bakery company is a service company.

A bakery company is administered the same way as are other military organizations. Its personnel is required to be well clothed, well fed and to be in first-class physical condition at all times, ready for any emergency. The only difference between the baker and any other kind of soldier is the use of arms. With the soldier it is the man behind the gun and with the baker it is the man behind the oven. Both have to be physically fit and ready to meet any emergency.

Our field bakery equipment was evolved in the service and is very complete in all its equipment. The company is provided with 12 ovens, one for each unit, complete in all its equipment, so that one unit with six bakers can bake sufficient bread for a regiment of soldiers at war strength, which is approximately 3,600 men. These ovens are capable of turning out more than 4,000 pounds of bread in each 24 hours, when worked with three shifts of six men each, continuously. It can be operated anywhere under any service conditions, with any kind of fuel. It can be operated as one single unit, or as a company of 12 units, or as many units as it may be necessary to assemble to provide bread for any size command.

It is the purpose of the War Department to give a certain amount of training to reserve organizations by sending them to training camps not to exceed 15 days each year. This year 50 per cent of the bakery companies here in Chicago have been selected to go to training camps, which means that the officers are called into active service, with all the pay and allowances that are given to Regular officers for that period of time. They generally find this experience a very pleasant one. It not only gives them a certain amount of military and physical training, but throws them in contact with other officers, which is bound to result in mutual confidence and friendship.

# What About Breads?

### *We May Eat What We Choose If We Include the Green Vegetables*

**There may be several kinds of bread on the plate, whole wheat, rye, raisin and white. Every kind is good, every one furnishes a quick and generous supply of energy. There are still many people who are persuaded that their way to health is via the whole wheat bread route. Others choose the bread they like best. Both are equally well served for all breads are recommended by modern nutritional authorities.**

**The Food Bureau of the New York Telegram has summed up the arguments for both sides of the bread controversy and logically decided that it is not the bread which determines the nutritional balance of the meal but the milk, and fruits and green vegetables which are eaten with it.**

"WHITE bread or whole wheat? Is the product of bolted flour bad for us? Is the whole loaf really the food for health?

It makes but little difference. The important point is quite far removed from a discussion of the respective merits of white breads and dark. So, in order to maintain the necessary ''suspense'' to make our story worth the telling, we shall keep our climax until later.

Our best authority, Dr. E. V. McCollum, tells us that forty per cent of our total energy supply comes from our intake of cereals, particularly wheat flour. Consequently the question of breads is indeed a grave one, and these are the arguments which scientists have piled up in favor of the whole wheat loaf against the bolted flour breads.

### *Advantages of Whole Wheat*

Whole wheat is a corrective for our national failing—faulty elimination—a deplorable minor malady which is said to be caused largely by the presence in our diet of just such foods as white bread, potatoes, sugar and meats. Whole wheat products require careful and thorough mastication, and thus provide exercise for teeth and jaws. Whole wheat flour rates higher than the bolted product in proteins, minerals and vitamin. With this array of arguments in its favor why isn't it more popular, and should it be? Let's hear the other side.

### *Points in Favor of White Breads*

The points in favor of white flour products are economic, dealing with the location of our grain growing and milk producing regions, and due to the fact that bolted flour has the faculty of keeping for months, an advantage over whole wheat flour, which readily turns rancid and is unfit for use. Moreover, last and most important of all, the larger part of the civilized world likes white bread, prefers it, clings to it and will have no substitute, come what may. And there is still a solution to the problem.

### *Besides the Bread Eat—*

All of the deficiencies of our chosen bread may be made good by the rest of our diet, whether we tread the lean path and eat whole wheat bread, or whether we cling to our own personal preferences and eat white, in defiance of the health cranks. Even if we turned with one accord to the consumption of whole wheat bread, its advantages would not make up for a very severe lack in our national diet—vitamin A. So we may readily, and without fear, cling to our bolted flour product, and only take care to remember to supply what is missing in the form of milk, which possesses all the virtues a single food could possibly boast. Milk supplies all the calcium and vitamin A which is missing in the whole wheat product, and taken in conjunction with any sane diet, cannot but make its protective work seen and felt.

After all, this quality of possessing minerals is the one which should have the greatest appeal for us. While our diet lacks them, bone and teeth structure must remain imperfect. Calcium and phosphorus should and must be relatively present in our diets to perform their wonders, a lack of one and a superabundance of the other being as undesirable as complete absence of both. Milk supplies these elements in abundance, and has all the advantages of the whole wheat loaf into the bargain.

### *Not Bread, but Milk and Vegetables*

Not which kind of bread—but the determination to add milk and vegetables to all meals—should be our problem. Wheat flour substituted for white while we continue to disregard this need will profit us but little. The eminently serious problem of bone and tooth development—the dangers arising from the deficiency diseases which are a menacing expression of this lack—should after all receive more close attention than the differences between whole wheat and white breads. The chewing qualities of the two breads are a trifling point when one considers that our need is not so much to exercise our lazy jaws as to take the trouble to see that in our daily dietary go milk, two salads a day, and fresh fruits. This change, strictly adhered to, is so productive of good results that those who cleave to it, and forget, in their new enthusiasm, the dissensions over types of bread—eating the one they prefer and thinking no more about it—will be parties to a welcome change in added health and vigor."

Re-printed from the New York Telegram Food Bureau—Elizabeth Hallam Bohn, Director.

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## *We Approve This Conspiracy*

HERE is the latest food conspiracy against the American people. The National Pie Bakers' Association has determined upon an advertising campaign to make the American people eat pie three times a day.

Not a bad conspiracy, either, if you ask the average man or boy. There might easily be a father and son movement of national scope, in harmony with this plan. Mother might object. Yet she needn't, because the professional pie bakers are perfectly willing to bake all the pies.

Fruit growers' association are heartily in favor of the campaign.

Only doctors here and there may kick. Some diet specialists may say that pie is unwholesome, especially when eaten in quantity, and that three times a day is too often to indulge. The average American today, they will say, living a sedentary life, cannot digest all that pie as his active forefathers could.

This, however, isn't necessarily an argument against pie. There is another way of going about the problem. Why not start a campaign, in which the doctors could co-operate, to bring the whole nation up to a state of rugged health in which it could both relish and digest pie three times a day?

—Marlboro Enterprise.

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Sorrow and night watches are lessened when there is bread.

—Old English Proverb.

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If we had had money to buy bread, meat and onions our neighbor would have lent us a saucepan.

—Old French Proverb.

# Books for the Baking Laboratory

YOUR FOODS AND YOU. By Ida Bailey Allen, 209 pp. Doubleday, Page & Co. Price $1.50 net.

Food is the most discussed subject of human life. Three times a day and between meals it commands attention If our minds are not awake to the need for food our stomachs never forget to call for more work to do. Through all the ages the urge to eat has been directed by Mother Nature. In recent years, since we came out of the cave to roast our meat before the fire to improve its flavor or soften its sinews, we have taken more or less thought in selecting and preparing our food. And the business of providing the fuel for our bodily machines and the proper chemicals for each living cell has become a science, still crude and incomplete but each year better equipped to supplement the demands of our appetites with correct quantities of proteins, vitamins and mineral salts.

Much of the advice about our food is given us by manufacturers of predigested breakfast goods, coffeeless coffee, substitutes for meats, eggs and every other natural and normal food. And when the copywriters run out of words with which to stimulate our appetites into eating more sauerkraut or cranberries or prunes, the book shelves are crowded with nutritional advice on how to eat to live. Most of this popular literature is utterly worthless. Much of it is scientifically absurd. Some of it is dangerous.

In Your Fads and You, Mrs. Allen has avoided the common errors of generalizing facts until they lose all value for individual use, or assuming that all persons have the same nutritional needs. She has, with the assistance of intelligent physicians and experts in special dietetic fields, prepared a series of instructional articles which are admirably adapted for study by underweights and overweights, by rheumatics and diabetics, by those who would improve their complexion, or prepare for a public appearance.

The structure of the book is admirable. The twenty-three chapters are written for the play of life. A prologue explains that the book is prepared from a series of articles originally published in the Medical Review of Reviews. The tragedy of ill health in which the family makes up the cast and wrong diet plays the villain, is enacted in the home. The production is staged in an ideal kitchen and one actor after another enters to show in realistic fashion how ill health is often due to unwise eating and how the proper choice and preparation of food will foil the villain ill health.

Part II translates the phrases of the physician in simple language and defines in detail the essentials of liquid and soft diets, and post operative and convalescent diets.

In fifty well arranged pages, part III collects many worth while recipes for invalid feeding.

Edward M. Stevenson has contributed greatly toward making the book an interesting volume for general reading with a series of clever illustrations.

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## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Report on (the determination of) ash in cereal products.** C. E. Mangels. J. Assoc. Official Agr. Chem. 8, 671-5 (1925): cf. C. A. 19, 543.—Collaborative results on ashing by ignition to a grey ash at 550° and by the Hertwig-Bailey method (C. A. 18, 2,394) showed good agreement between the 2 methods. The latter gives results in less time, but requires either considerable attention to prevent frothing over or else the use of a large platinum dish or crucible. Addition of $Ca(OAc)_2$ allows of igniting at a higher temperature without volatilization of the ash constituents, 20 mg. CaO (as $Ct[OAc]_2$) preventing fusion of the ash of both clear and patent flours at 1,000, with consequent reduction in the time required for ashing.

A. Papineau-Couture.

**Treatment of flour with chlorine and the so-called Golo method of improving flour.** M. P. Neumann and H. Kalning. Landw. Jahrb. 61, 305-19 (1925)—Flour rapidly absorbs Cl or Cl with 0.5-1.5% of nitrosyl chloride, as in the Golo treatment, and for normal concentrations of Cl (0.015-0.02%) there is no odor and no HCl or $HNO_3$ can be detected. The treatment increases the swelling power of the colloidal substances and the strength of the flour, and also its acidity and the solubility of the N compounds. The activity of the enzymes and the keeping qualities are not affected. Excessive Cl treatment of soft wheats has no beneficial effect. B. C. A.

**The use of high carbohydrate diets in the treatment of diabetes mellitus.** W. D. Sansum, N. R. Blatherwick and Ruth Bowden. J. Am. Med. Assoc. 86, 178-81 (1926).—With the use of high carbohydrate diets, insulin-treated patients were kept with the urine sugar free and with a normal blood sugar. The patients were restored to a more nearly normal state of physical and mental activity, and were freed from the slightest traces of the acetone type of acidosis. The potatoes, milk and fruits eliminated the acid ash of acidosis, which, it is believed, has been the cause of the high incidence of blood vessel disease. The diets are more palatable and the patients lose their craving for forbidden foods. A somewhat lower caloric intake apparently is required for full maintenance. The diets are cheaper as they contain no special food and much less of expensive fats.

L. W. Riggs.

**Rapid method for the determination of the ash of flour.** J. Tausz and H. Rumm. Chem.-Ztg. 49, 665-6 (1925).—Former attempts to shorten the time of ashing of flour involved the addition of various substances as $H_2O_2$, alcohol, or $NH_4NO_3$, or of their solutions, to the coke residue. Usually it was the $H_2O$ or the $H_2O$ vapor which was effective. Tausz's and Rum's method makes use of moist $O_2$, and is more rapid than the others, requiring only ½ hour. A piece of gold foil, holding about 1 gram flour in tablet form, is weighed and then placed in a Rose crucible. By use of a fireclay crucible oven, heated by a small flame, the flour is converted in 3 minutes into a coke tablet. The crucible is then heated to about 800° and moist $O_2$ is pased in during the 15-20 minutes required for ashing. The gold foil and ash, placed on a Cu block, can soon be weighed.

M. W. McP.

**Humidity equilibria of milk powders.** G. C. Supplee. J. Dairy Science 9, 50-61 (1926).—Drum and spray process powders were held over $H_2SO_4$ solutions for periods up to 6 months. Above 50% humidity hydration is rapid. It follows a smooth curve irrespective of the process of manufacture except for a break at 50%, which does not occur in dehydration. Excessive heating or previous saturation alters the absorptive properties of all types of milk powders. There was decreased absorption and retention of moisture with increasing fat content of the milk powder.

F. L. Seymour-Jones.

# Patents

**Bread.** B. Lowy. U. S. 1,559,330, Oct. 27. Acid milk is mixed with Ca phosphate at 40° to produce a Ca lacto-phosphate, $NH_4$ tartrate is added, the composition is mixed with yeast, salt, sugar, and $H_2O$, and this aqueous mixture is used with flour to form a dough in the relative proportions of about 1:100, shortening is added and the dough ingredients are thoroughly mixed at a temperature of about 30°.

**Hydrogen-ion concentration of flour.** F. L. Dunlap. U. S. 1,560,045, Nov. 3. In producing crackers, cookies or other bakery products, the shortening effect of the flour is increased by giving it an increased acidity up to about a pH of 3, at about which point the "shortening" effect is at a maximum. The flour may be treated with Cl or HCl before use in the dough or the dough may be treated with HCl, $H_3PO_4$, HOAc, lactic acid or other harmless acids.

**Bread.** L. C. Reese. U. S. 1,544,481, June 30. In baking bread, gases are withdrawn from the oven by a steam injector, the mixture of gases and steam is superheated and is then returned to the oven.

**Conditioning wheat, flour, etc.** D. W. Kent-Jones, C. W. Chitty and Woodlands, Ltd. Brit. 228, 830, Sept. 12, 1923. Wheat is treated to improve the gluten strength of the flour made from it by heating it to 50–90 degrees, in an apparatus from which moisture can escape (but without passage of air through the material) for a time less than that which would render the gluten non-retainable when the flour is submitted to the washing test (e.g., a time of about 4 days at 50 degrees, or 2 hours at about 70 degrees). Reference is also made to treating flour by a similar method.

**Bread.** T. B. Wagner and C. A. Glabau. Brit. 235,874. June 21, 1924. In order to eliminate the usual fermentation period in making leavened bread and the like, substances are added to the dough which serve as yeast activators, foods, or stimulants and gluten-maturing agents. Among the substances employed are $NH_4$ phosphate or sulfate, K persulfate, $KCIO_4$ or a composition obtained from acid steep water from maize which is neutralized with Ca $(OH_2)$, heated and the resulting precipitate washed and dried. Malt extracts, buttermilk, acid salts or lactic, malic, mucic acids or HCl or $H_3PO_4$ also may be used.

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# New Food Affinities

*Bread is the Staff of Life and Butter Its Golden Crown.*

IN connection with discussions on a complete food, probably the outstanding development in food production in recent years is the rapidly growing movement toward bringing bread and dairy products into closer alliance. It is generally recognized that bread and dairy products are natural affinities. We have been told that bread is the staff of life, whereas butter is the golden crown for that staff, and milk long has been recognized as an accepted companion in this food trinity.

It is due to the interest in the matter of the American Institute of Baking, that the American public every day is receiving more bread made with milk. With great rapidity this practice is spreading among bakers of the country. The opinion seems to be well supported that in the next five years few, if any, bakers will be found who are not using milk in their bread.

Few articles of food are complete in themselves. This is not generally realized. Milk is one of them. But none of us would care to attempt to live on it alone. Mixed with bread, milk gives to the loaf an ingredient that is a complete food, imparting important vitamins.

Occasionally a report arises that there is something lacking in bread. Experimenting with loaves made from water it has been found that not only will this bread fail to make rats grow, but it will not keep them alive. Milk bread, however, which comes forward with the newer knowledge of nutrition, not only will make rats gain weight, but will keep them alive into a ripe old age.

Nutritional studies of the problems entering into the baking of commercial bread have been carried on in the nature of feeding tests to compare the nutritional value of bread with apples, spinach and potatoes. It has been shown that while bread is not a complete food, these other foods are even less so, and that milk-made bread is far superior to all of them.

Of considerable dietary importance is the fact that the milk proteins afford, in general, a good protein supplement to the cereals which are generally so conspicuous in the dietary of man.

Dr. Lafayette Mendel believes that the possibilities of milk and some of its numerous products from a culinary standpoint deserve more emphasis than has been given to them heretofore. The propaganda to "drink more milk," for instance, meets with real or fancied limitations in some persons.

"It is, however, often agreeable or advantageous to increase the intake of certain ingredients of milk by the use of products other than fluid milk. Herein lies the opportunity for the introduction of some of the increasing varieties of milk-made foods."

**—The Milk Dealer, April 1926.**

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## *Trained Intelligence*

Everything flows from the application of trained intelligence, and invested capital is the result of brains.... The man of trained intelligence is a public asset..... We go forward only through the trained intelligence of individuals, but we, not the individuals, are the beneficiaries of that trained intelligence. In the very nature of things we cannot all have the training, but we can all have the benefits.

**—Calvin Coolidge.**

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# Safe Weighs to Health

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IN these days of self imposed famine conditions when potatoes are tabooed by every young girl and most of their mothers, when candies have lost their lure and a hearty meal is shunned as an ungodly temptation to mortal flesh it is reassuring to know that the organized club women of America have stopped in the midst of their varied activities to sound a note of alarm against unwise dieting. If any word of warning will lead us back to paths of nutritional sanity, away from the strange styles which make pernicious anemia a desirable attribute of feminine loveliness, out from under the influence of styles which have put Venus di Milo with her normal curves behind the scenes and made straight lines the lines of grace and beauty it is the resolution which was adopted by the General Federation of Women's Clubs at its Biennial Convention recently held at Atlantic City.

One of the most important departments of Federation work is that which is concerned with the public welfare. Under the leadership of its chairman, Mrs. Walter McNab Miller, so well and favorably known to the baking industry because of the constructive message she brought to it at the Buffalo convention and because of her interest in the work of the Department of Nutritional Education of the Institute, several days of the convention were devoted to the consideration of subjects which relate to the upbuilding of a finer citizenship through better living conditions, improved public health and a keener appreciation of the fact that the quality of the generations ahead will be determined by the vigor and healthfulness of the children of today.

### *Health Must Not Be Imperilled*

The adoption of a resolution urging women not to imperil their health and that of future generations by self-imposed reducing methods was a logical recognition of the major importance of sound nutrition, free from fads and foolishness, in establishing and maintaining good health.

The resolution recognized the perils of unwise and ill advised dieting and as well suggested the necessity for the intelligent study of the whole subject of body weight in its relation to health.

In the early spring a group of interested men and women met in New York to organize an Adult Weight Conference. This conference was made possible by the keen interest of the Delineator Magazine in the promotion of public health. And it was most fitting that the resolutions endorsed the work of this conference and its efforts to set up an adequate measure of normal weight.

The resolutions which offer the first real opportunity for a counter attack on the amylophobia which has so affected millions of people read as follows:

> **Whereas,** reducing body weight has become a national practice, and
>
> **Whereas,** many women and girls have injured their health by reducing nostrums and wrong and injurious methods of dieting, and by bringing themselves below their normal healthy weight, while others are dangerously over-weight, and
>
> **Whereas,** there are at present no adequate tables which tell women what they ought to weigh; therefore
>
> **Be it Resolved,** by the General Federation of Women's Clubs in Convention assembled, that we urge the women of America not to imperil their health and that of future generations by reducing methods other than those advocated by reliable physicians; and be it further
>
> **Resolved,** that the General Federation of Women's Clubs endorses the recent Adult Weight Conference, and that it heartily approves the efforts now being made to formulate a reliable height-weight scale for women.

The effect these admirable resolutions may have on generations yet to come cannot be estimated. Their value today will, we trust, soon be determined by the remodelling of our fashion plates and pages and the adoption of new standards of health and beauty that are not based on fleshless forms nor shrunken figures. A new movement was started at Atlantic City which will not only reconstruct the nutritional notions of three million mothers and home makers but build strong bodies to do the work of the world.

### *Public Opinion Must Be Created*

But the adoption of resolutions which recognize sound facts and suggest adequate remedies for unsound conditions will make but little progress towards the goal to which they are directed unless public opinion is also similarly influenced. Public opinion does not develop spontaneously. It is created. And its quality is determined by its parentage. The parentage of the effort to put substantial meals on our breakfast and dinner tables that every underweight person may get all the calories he needs and high school girls and young women may build up reserve supplies of energy and enjoy abounding vitality is blue blooded. No organization in America holds a greater potential power for good than the General Federation of Women's Clubs. It reaches into every home in which thinking women live and plan and work for the betterment of themselves, their children and the society of which they are an influential part.

### *Other Agencies Must Help*

And yet many other agencies which influence public opinion will have to be brought into action before the deep seated idea that underweight is conducive to health is uprooted. The medical profession, dietitians, nurses and other groups which direct nutritional habits are fully aware of the evils of malnutrition. They know that work requires energy foods and that the amount of work the human engine can do is measured directly by the fuel burned or metabolized into action. They know that the human animal can no more be strong and healthy on a limited diet than any other animal. They teach the need for a well chosen diet, balanced as to its protein, fat, carbohydrate, mineral and vitamin content and amply sufficient to energize the body for its daily work requirements, and to store up as well ample reserves against unusual needs.

But so much has been said and written about the dangers of obesity and "digging one's grave with the teeth" that half the joy of eating is destroyed by the necessity of counting calories. Yet except in special cases normal appetites are the best determinators of the kind and amount of food required. So the too common practice of consulting the beauty columns of the morning paper for advice on how to reduce, how to keep thin, how to live long and how to be happy is as unnecessary as it is unwise.

### *Obesity May Be Pathological*

If one has either an inherited or acquired tendency to overweight the condition must be corrected. But it is just as dangerous to self-prescribe remedies for pathological conditions of obesity as it is to attempt to regulate the functions of heart or kidneys without expert assistance.

The adoption of reducing methods which are not advocated by reliable physicians is therefore most properly considered unwise by the club women. If the editors of daily papers and magazines would come to the same conclusion and put their departments of health and nutrition in the hands of competent persons the progress of the movement for normal weight would be rapid.

There may be sound reasons for deploring the rigid rule of censorship of public morals, movies and the stage but the exploitation of viciousness compelled censorship. Has not the time come when in the public interest it may be advisable to establish a similar censorship over the writings and utterances of the self-appointed "experts" in the field of nutrition, the growing group of faddists who find easy profits in the exploitation of strange diets and who through the very absurdities of their teachings attract attention to their wierd suggestions that the only road to health is via raw foods, meatless foods, so-called natural foods, whatever they may be, and all the other strange efforts to nourish the body with materials which are chemically inadequate for that purpose.

### *Authorities Recognize Need for Ample Diet*

If the facts of nutrition were not well known, if there were any real difference of opinion as to just what food does and how it does it, if the chemistry of the human body were different from the chemistry of the college laboratory, there might be some excuse for the too common acceptance of dangerous and untrue theories of diet. But the schools of nutrition which are the widest apart in their ideas, as for instance the vegetarians and those who find no evil in a good steak, all recognize the necessity for an ample diet in which the food essentials are well balanced and properly combined.

If the action of the General Federation of Women's Clubs in urging the women of America to take counsel of recognized authorities in matters affecting their health and the welfare of the race is followed by similar intelligent efforts to bring a close to this self-imposed famine period; and if the discussion of nutrition and the diet is left to those who know what they are talking about we shall soon see fewer anaemic and underfed persons and make real progress in the effort to conquer malnutrition.

## *When the Bakers Saved Vienna*

DURING the siege of Vienna by the Turks in 1683 bakers' apprentices were at work one night in an underground bakehouse. The boys heard a rhythmic thump! thump! and were puzzled by it. Two of the apprentices guessed that the Turks were driving a mine, and ran to the commandant of Vienna with the news. An engineer was sent to the underground bakehouse, and decided that the boys were right. The Austrians got the direction from the sound aud drove a second tunnel, laying a mine which they exploded. Great numbers of Turks were killed, and the siege was temporarily raised. On September 12 of the same year John Sobieski, king of Poland, utterly routed the Turks and drove them back into their own country.

As a reward for their intelligence, the baker boys were granted the privilege of making and selling a rich roll in the shape of the Turkish emblem, the crescent. The rolls became very popular with the Viennese, who called them kipfeln. When Marie Antoinette married Louis XVI of France she missed her kipfeln and sent to Vienna for an Austrian baker to teach Paris bakers the art of making them. The rolls—known in France as croissants—retained their original shape and became as popular in Paris as they were in Vienna. This is why one of the rolls that is brought with morning coffee today in Paris is baked in the form of a crescent.

—George Miller in Boy's World.

## *Getting Together*

THE wheat farmer and the dairy farmer have a mutual interest. A thing so common as a sandwich brings them together. Bread has been considered the staff of life and milk is our most essential food. Butter and cheese are most important foods. There's a happy combination between bread, milk, butter, and cheese.

At the National Dairy Exposition, the American Institute of Baking showed how this combination could be made. Wheat flour doesn't contain a perfect protein and it lacks in mineral substances. Milk contains a complete protein and is rich in mineral matter. In the use of powdered skimmilk in the making of bread we come close to obtaining a balanced ration. To complete it the bread is spread thick with butter and then there is placed between two slices a tasty piece of cheese.

The American Institute of Baking was busy from early morning to late at night handing out toasted cheese sandwiches at the Dairy Show. If any one doubts that this is not a most happy-get-together, just try the combination.

—From Hoard's Dairyman.

## *A New Cereal Story*

HEADLINES are read when the story under them is neglected. Our Daily Bread department of the New York Telegram gives a new version to an old tale and intrigues the reader's interest by a clever allusion to a new "cereal" story.

"The historic New England song about 'beans for breakfast down on the Bigelow farm' has been supplanted to a great degree by a refrain to the effect that we now have cereals forced down our unwilling throats as a prelude to the day's work. And the last verse of our ditty might be to the effect that we take this action on the part of our well-meaning cooks as being prompted by good feeling, but indicative of lack of imagination. For cereals can become more deadly than the serpent's fangs after a time. But those who know ascribe to them a unique power in diet and insist that we cannot be strong and well, bright eyed and good tempered unless we tuck away just so much cereal every morning. That being that, but little effort is made to relieve the tedium of cereal breakfasts."

We must take exception to this statement. On the contrary more real progress is being made towards supplying palatable and delightful cereal breakfasts in this spring of 1926 than ever before since man first stirred his porridge. It isn't porridge now, however. It is toast, crisp brown, buttery, crunchy toast. Spoon fed breakfasts are no longer the style, dietetically or artistically. Sloppy, sugary, slip-down-easily cereals, predigested for tired stomachs, or made ready to serve for kitchenette families are no longer the beginning of a happy day. The new cereal is toast, made to order on the table, surrounded by rashers of bacon and crowned by a golden globed egg. All praise to the man who first sounded the slogan "make toast your breakfast food."

## *Stop Crying and Get Busy*

WHENEVER attention is called to the decreased consumption of flour the explainers come forward to tell us the reason therefore.

Their deductions are: one, sugar is used instead of starch as the energy food; two, the diet is no longer restricted to simple foods; three, the desire for slim figures has turned the feminine population away from bread to grape fruit and spinach. It is probable that all these reasons have a real basis in fact. And with the facts at hand it should be possible to cope with the conditions which they explain.

The first two reasons are partly economic in character, but the third is almost wholly psychological. And the means with which to put bread and products made from flour back into the dietary has been provided us by the far sighted action of the General Federation of Women's Clubs in adopting a resolution calling attention to the fact that many women and girls have injured their health by reducing nostrums and injurious methods of dieting and by bringing themselves below their normal healthy weight, and then urging the women of America not to imperil their health and that of future generations by reducing methods other than those advocated by reliable physicians.

No more far reaching action has ever been taken by this great organization which represents more than three million women than that which resulted in the unanimous adoption of this resolution against reducing. With such authority behind them it should be easy for millers and bakers to meet the faddists who have been preaching the danger of starchy foods. The organized women have done what they could to cure a dangerous habit. What will the organized millers and bakers do?

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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## We Work Together

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# "God Helps Those Who Help Themselves"

A WELL-KNOWN writer recently said, "Man was put in the world to help God." God put iron ore in the earth, but man made locomotives, steel rails and automobiles. HE created coal, but man made boilers and furnaces. HE made opportunity, man's duty is to make the most of it.

Progressive bakers are studying nutrition earnestly, thoughtfully, carefully, that their products may help produce better bodies and better minds. We now know that a well-balanced diet, systematically employed, would in one generation empty one-half of our penal institutions, our hospitals and our asylums for the indigent and insane.

It is realized that we have been spending large sums of money annually in handling an effect when we should have been trying to remove the cause. The American Institute of Baking is trying to help remove the cause by first educating its own members as to the nutritional value of the baker's products and then educating the public to use them. The Creator gave us the opportunity, we have been a long time in finding it out. Now let us make the most of it. Write the American Institute of Baking for facts regarding the nutritional value of baker's products.

L. J. SCHUMAKER,
*President, American Bakers Association.*

# What Price Membership

ONE loaf of bread per oven per day per year!

Figure it out for yourself—could one pay less to belong to a business association that gives—

More power to members—
More enlightenment on production—
More intelligence in merchandising?

We are tremendously interested in the small bakeries that are worth while and can be properly and profitably developed into larger ones—many of our present members grew that way—why not you?

All of our members receive that same intensive co-operation for better production, better merchandising and increased sales, that is ordinarily enjoyed by only the very largest bakeries.

The Departments of the American Institute of Baking are continuously concentrating on basic plans to find those links between the Baker-Retailer-Consumer that build for a bigger and better baking business.

Can you afford to stay out? Ask your Banker — your Accountant — the Allied Tradesmen who call on you daily—face the facts and—join today!

L. A. SCHILLINGER,
*Chairman, Membership Committee,*
*American Bakers Association.*

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# *New Relationships*

IN addressing the leading men in industry who met in May at the Fourteenth Annual Conference of the Chamber of Commerce of the United States, Herbert Hoover discussed some of the social and economic currents that have been developing in American business and industry during the past quarter of a century. Every member of a trade association will be interested in the following excerpts from his address:

Dimly but no less certainly, there is looming up in America a new relationship in the whole setting of industry. It is departing widely from the conceptions of the old world. We are making progress in our own way in the fundamental relations of industry and commerce to its employees, to the public, and to the government. We are finding from it increasing standards of living and increasing diffusion of wealth and comfort.

Our economic system is not perfect. It never will be so long as it remains dynamic with new invention, new discovery and enlarged vision of men. There may be gunmen in every trade and industry, but if they dominated it we should have collapsed long since. Our job is to support the American system at every point where it brings benefit to our people at large and to correct it at every point where it is making for error and weakness.

The last quarter of a century has seen a vast growth of associational activities—chambers of commerce, trade associations, professional associations, labor unions, trade councils, civic associations, farmers co-operative associations, all numbering into the thousands, until there is scarcely an individual in our country who does not belong to more than one of them. These associations have grown up with various objectives. Some, a minority, are selfish and narrow. They all represent a vast ferment of conscious co-operation. The great majority today have a recognition of their public responsibilities, as well as the protection of their own interest.

# *Back Numbers Are Valuable*

THERE usually comes a day when the back numbers are sought for. They may be old employees whose long experience has given them a command over materials and processes; they may be old chairs, old silver, old homes, long since supplanted by the art of modernity; they may be old formulas laid aside while changing tastes seek new flavors, or they may be Baking Technologies, read and piled back on the shelves, worth keeping because of some special article and yet not sufficiently prized to justify binding and a place in the library.

And yet many numbers among the fifty which have been printed since the first issue of Baking Technology carried its story of the Institute and of the science of food and nutrition to the baking industry are out of print.

The editions were as large as there seemed any need for, but now that the last copies have been sent out it is necessary either to reprint the copies which are in constant demand or to find somewhere the issues which are lacking.

Within the past few months five requests have been received for complete sets of Baking Technology desired by libraries and scientific institutions. With the help of our friends we were able to complete the sets. But this will not be possible much longer. And so we urge our readers to file every copy of Baking Technology as soon as it has been read and at the close of the year to bind the volume. It is worth keeping.

R. E. P.

# Science and the Investor

## *The Stake of the Investor in the Development of Chemistry**

By Hugh Farrell

ARE you the owner of the stocks, bonds or other securities of any of the more than 200,000 corporations engaged in manufacturing, mining, transportation and various other pursuits in this country? If so, you had better begin to make inquiries with respect to what the companies in which you are interested are doing in the matter of keeping in step with progress in chemistry and chemical engineering.

The chemist is revolutionizing industry. He is developing new products and new ideas every hour of every day. As a result of his work flourishing industries are being scrapped overnight.

New industries take the place of the old, of course, but, except in the instances in which the managers of the old industries have been wise enough and cautious enough to anticipate changes by keeping in touch with the progress of science the new industries have new managers and new owners—the old managers and the old owners are wiped out.

Formerly these changes came slowly, but now they are coming faster. It has been many years, as reckoned by a single lifetime, since the indigo growers of India lost their means of livelihood and their investment in the indigo industry as a result of the discovery of a chemical method of manufacturing a purer indigo from the waste products of coke manufacture.

Since that time, within the last year or so, in fact, the chemist has learned to make artificial silk, artificial rubber, artificial dyes and, in addition, has actually created any number of things that never existed before at all. Some of these products have not been perfected and, at the present stage of their development, a few compare poorly with the natural products which ultimately they may supplant, but the perfecting of synthetic rubber and other products is only a matter of time; perhaps a very short time.

### *The Chemist Surpasses Nature*

In most cases the chemist not only succeeds in duplicating the product of nature's laboratory; he actually improves upon the natural product—makes a stronger, purer and a more lasting thing than nature can make. The chemist can even make more beautiful things than nature can make—his colors, or some of them have no counterpart in nature and are vastly more brilliant and enduring.

If you don't know about what the chemist is doing you are due to receive some startling information, expecially if you have your money invested in some industry or other which is running the risk of having its product matched or bettered in the laboratory at a production cost which the concern in which you are interested cannot meet.

### *What Happened to One Industry*

Some such thing as this recently happened to the distillers of wood alcohol. This industry with more than $100,000,000 invested and an annual production valued at something around $35,000,000 a year, has been dealt a very hard blow.

At the beginning of 1925 the industry reported that all was right with it and that the goose hung high. Two months later it didn't know whether it was an industry or not, or whether it was anything. In the meantime, or before (although the American wood alcohol industry didn't know it), a Frenchman and a German, too, discovered a process for manufacturing methanol (which is the scientific name for the kind of alcohol that is distilled from wood) that is so much cheaper than the distillation process that if all that the inventors of the new process claim is true the wood alcohol industry in its present form will simply cease to exist.

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* From What Price Progress—published by The Chemical Foundation, Inc.

Suppose what happened to the wood alcohol industry should happen to the steel industry, or the oil industry, or the leather, or rubber, or sugar, or baking, or any other of the numerous industries whose securities are owned and dealt in by the investing public?

It can happen to them! There is no business today whose welfare and interest are not bound up with chemistry. Chemistry is the science of the transformation of matter, and that is what industry must ultimately become. There is no industry —not one, that is not in danger of waking up tomorrow and finding that the chemist has made a discovery that might revolutionize it.

Some of our greatest industries, the oil industry, for example, are subject to hazards of revolutionary change just as great as that which confronts the wood alcohol industry. The chemist can and may find a substitute for gasoline that would revolutionize that industry. It may be that he has already found such a substitute.

### *The Chemist Cuts Down Costs*

However, the chemist is dealing with matter in a way that is more likely to produce things that will complement, instead of displace existing products, or that will make the things that are already being produced purer and cheaper. He is making two dollars grow where one grew before by purifying and simplifying all kinds of products.

The investor whose money is really in danger is the investor who has put his savings into industries which are not keeping up with the times in the matter of new processes and methods of manufacture of fundamental resources. Such an investor has real cause for alarm and a real grievance against the managers of the concerns in which his money is invested.

Investors themselves are often responsible for the neglect of their representatives in an industry to keep abreast of the times. The investor may feel that a bird in the hand is worth two in a bush and be so much more anxious for the extra dividend he might get if his company's funds were paid out in that way than he is concerned over the security of his principal that the managers of his company hesitate to spend the money on research.

Yet the average investor knows that the first principle of sound investment is security of principal. That principal of investment is hammered into the investor from every side. **No industry which does not command the services of chemists and the resources of laboratories can be regarded as secure.**

If you have an impression that the chemist is an ogre who gobbles up industries—forget it. The chemist is not a destroyer; he is a builder, a purifier, a simplifier and a creator.

His discoveries may render the machinery and the materials used in the manufacture of certain products obsolete and valueless, but the chemist usually improves or cheapens the cost of the product itself.

### *How Individual Industries Will Survive*

In a competitive society, such as that under which we live, nothing is more important to the survival of individual industries than continuing ability to produce goods at cost that at least are no higher than the cost of competitors. The industry which fails to keep up in the race for lower costs falls by the wayside, and the investor whose money is employed in that industry falls with it.

At the times when competition for markets is the keenest, the search for cheapening processes is intensified and the industry which has taken the longest look ahead is the industry that survives. At such times the manufacturer who has failed to guard against the day of keener competition is forced to fall back on cuts in wages and futile attempts to lower costs by raising the value of money.

Nothing valuable is ever accomplished in that way. As long as lower costs are obtained through the elimination of waste of materials and labor—that is, through improvements in processes—society in general and the investor in particular are benefited. For lowering costs, after this manner, means lowering them by increasing production or, at least, by getting an equal volume at lessened outlay. In this country we have always progressed in this way—mass production through machine and mechanical processing explains the great strides we have already made.

### *There Is No Wizardry in Chemistry*

The field of chemistry is as broad as all industry. Everything that we touch, see, smell; everything that we use, light, heat, transportation; everything that we consume, food, clothing—everything, is a chemical compound of some kind or other and can, in time, be reproduced synthetically.

Yet there is no mystery, no secrecy, no wizardry about chemistry. It is a simple science. If the layman goes too deeply into it he will become confused, but his confusion will arise from the immensity of detail, the illimitableness of its possibilities more than from any difficulty that might prevent his understanding what it is that the chemist is after and how he proposes to go about to get it.

The American investor owes himself the obligation of supporting the managers of industry who are looking ahead and of forcing those who are not to wake up. Eternal research is the price of survival in modern industry. No investor or banker can feel sure that his interest in any security is secure in the absence of the assurance given by the knowledge that science is on guard. The producer who survives modern competition is the producer whose technical advisers know what is going on in the world and whose executives know how and when to supply their knowledge.

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## *A Prediction to be Fulfilled*

In a little editorial note in this week's issue of The Restaurant I tried to express my appreciation and that of the restaurant industry in your generous offer to help in any way your fine Institute could. I am sure, as the years go by, that all the food trades and organizations will be found working closer together. I receive Baking Technology regularly, and enjoy reading it, and "lifting" and passing on to others many of the good things it contains from your pen and others.

**—The Restaurant, Kansas City, Mo.**

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Associations are divided into two sections—builders and beggars: the former lift their trade and leave it better than they found it, while the beggars are the people with complaints and questionings.

**—G. A. Stapleton in**
**The British Baker.**

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Everyone gives bread but none does it like a mother. **—Old Italian Proverb.**

# The Art of Public Speaking

**Messages which fail to reach the hearer are worse than wasted. Every convention program gives alternate reactions of satisfaction and annoyance. Speakers who have little to say but who say that little well interest and help their hearers. Other men who are filled with authority but who do not know how to release their wisdom bore their audiences to tears. The following abstract of a Clinic on Public Speaking held at the annual meeting of the American Public Health Association should be committed to memory by every aspirant for a place on a convention program.**

THE Art of Public speaking is one of the necessary attributes of any sanitarian who wishes to deliver a message to the people, but eloquence is all too seldom possessed by health workers.

This thought introduced the clinic on public speaking of the Health Education and Publicity Section of the St. Louis meeting. Since its inception, this section has been noted for its unique and interesting program. This seldom includes set papers. The clinical method has been here successfully applied to the methods of health education. Clinical material for the public speaking clinic consisted of four brief typical talks, each intended for a special type of audience such as the health officer and other health workers have occasion frequently to address.

Professor Isaac Lippincott of Washington University, a master of public speech, was in the audience unknown to the speakers, and proceeded to criticise their talks when all had finished. His criticism included both the form and the substance of the addresses.

"Get down to your audience," he advised, "forget everything but your audience while you are speaking. Talk directly to people. You don't need to be oratorical." He pointed out that several of the speakers did not watch the audience. He praised the friendly manner of one of the speakers and criticised another for having read a paper instead of delivering a speech. A subject read is never likely to be so good as one delivered extemporaneously, due in part to the difference in inflection in speaking.

"One very troublesome problem of public speakers," continued the expert, "is their hands. They do not know what to do with them; they seem as heavy as shovels. The hands should not, as a rule, be placed in the pockets, but they should be used for gesture and emphasis. This aids the directness of delivery.

"A talk should be well organized, but not so well organized that it reveals the art of organization. It should not, for instance, be obviously blocked off into sections. There must be spontaneity. Enthusiasm is also a good thing on the part of the orator. If the speaker is not interested, the audience will not be interested, and it is a pretty sure thing that if the speaker has shown decidedly that he is interested, the audience will be."

The great need of knowing and appreciating an audience was stressed, though one discussant suggested that if you are really interested you can make your audience interested, whether you understand them or not. The obvious need for clear diction and a sufficiently loud voice to penetrate to the rear seats was also brought out. One physician declared that in this respect "the average medical speaker is a 'cussed' nuisance."

Brevity was cited as a virtue and it was suggested that the audience should be judged to know nothing about the subject. Human interest and appropriate allusions were praised as advantageous. A summarization was likewise commended.

"I am convinced of one thing first of all," said Dr. Lee K. Frankel, "if you have something to say, get it across in a few words. Back of it all, there must be personality, and in the last analysis I think that is the secret of success in public speaking."

## *A New Lunch Counter Success*

WHEN any industry or anybody makes a success out of an everyday job by giving it some new public appeal that is a real story. The Associated Press, which knows news, found just such a story at a New York lunch stand. Here is the story:

New York, April 16th.—Asso. Press.—Ever so often, some long-visioned individual looks over a hyper-developed industry on Broadway, then turns the wheel of progress back a couple of decades to start on broad, first principles—and makes a killin'.

The latest example is a lunch stand occupying a niche in a sidewalk store in the financial section where it is surrounded by restaurants of every degree. The proprietor, just passed the voting age, equipped the place with a clean carving knife, a mouth-watering boiled ham, a neat receptacle for mustard and a few loaves of bread, and made his "play" on the promise to "make 'em as you eat 'em."

There's a line-up every noon hour and his patrons include many men who have the attendance of an imported butler at dinner.

## *Shall We Carry Our Lunch?*

THE passing of the dinner pail is as definite a change in our habits as the passing of trailing skirts or piano box buggies or two dollar a day plasterers. Dinner pails loaded with pork chop sandwiches and half a dozen doughnuts and several cuts of pie are no longer needed when there is a lunch room around the corner from every working gang, or a car parked in the street which will carry five men five miles to dinner and bring them back again before the whistle blows. And yet prepared lunches will always have their use, and in these thermos bottle days they may be made both appetizing and nutritious. How a lunch box meal may be prepared is so fully described in the Daily Bread department of the New York Telegram that the mere reading of the story as told by Winifred Stuart Gibbs will ring the bell for more sandwiches.

### *Nutrition in a Lunch Box*

"There will always be certain conditions and circumstances which make a carried-from-home lunch a necessity, so that it is well worth while to know how to plan, prepare and pack the type of lunch box meal calculated to give the best results in nutrition and health. So when planning a lunch box meal, you may have to provide your own hot soup or beverage; therefore a thermos container is almost a necessity. Choose the receptacle for transporting the lunch as a whole with this in mind. The health-giving possibilities of a hot drink in the middle of the day are enormous. The stomach is roused from lethargy, the nerves are refreshed and the whole system made ready to do better justice to the other viands contained in the lunch container. This is especially true for desk workers. On the other hand, more active occupations, such as factory work, call just as loudly for a dash of heat. The reason for this is that the active muscular

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HOME ECONOMICS DEPARTMENT
UNIVERSITY OF ILLINOIS

exertion has, unless excessive, used just the right amount of tissue to make the body ready for a good meal, and the introduction of a hot fluid is one of the best ways of insuring the disposition of this meal.

Now for the other foods in the lunch box.

Let the portions be ample. Sandwiches cut from a good sized loaf will be more satisfying than the dainty shreds of thin bread and butter quite appropriate for afternoon tea. Both pieces of bread should be buttered, for the worker must be able to count on ample nourishment from the contents of his box, and fresh butter provides not only fat for energy and nerve tone but the important growth promoting vitamin as well.

### *Real Fillings for Sandwiches*

Let the sandwich filling be as nourishing as possible and spread the filling with a generous hand. Among the best fillings for the sandwiches for a worker's lunch box are:—Chopped cold beefsteak mixed with savory sweet pickle; thinly sliced strips of cold steak with salt and pepper seasoning only; chopped eggs with lettuce and salt dressing; salad of salmon or tuna fish with chopped celery and plenty of lettuce. Those are given simply as types. Let us not forget that lettuce will give the worker needed minerals, and so put in an extra lettuce sandwich with the more hearty meat or fish or egg sandwich. Another extra sandwich might be one with a sweet filling such as jelly, and this will supply the element of dessert.

Either an orange, an apple or banana should find a place in the box. Tuck in also a handful of raisins with a few nut meats.

Men do not as a rule care much for cake, but two or three 'fat' molasses cookies or a 'slab' of soft gingerbread will often find favor, and these are laxative foods, good for the diet as a whole.''

## *A Student Writes from Japan*

I WAS very busy to study how to make better bread. The more I study, the more I meet difficulties. We are very much delighted to inform you that we completed a traveling oven a few days ago after very hard work. The result is very good and we find better bread, but I am striving how to make the best one in the world. You will think that the work of the American Institute of Baking in Chicago of America begins to shine brightly even in Osaka of the Far East.

The weather here is chilly at night and early in the morning; but it gets warm in the middle of the day. ''Cherry blossoms'' will be full-bloomed in the middle of April.

If you could come to Japan in the near future and look at what we did, we should be very much pleased.

Wishing you the best health and happiness.

With best regards and thanks,
Most faithfully yours,
K. Mizutani,
Vice-President, Maruki-Go-Bakery.

## *Appreciated Material*

''We were very much pleased to receive the back numbers of the journal of the American Institute of Baking and also to be placed upon the permanent mailing list. We shall be able to make splendid use of this scientific material. It is our intention to place all of this material in our class room so that it may be utilized for instructional purposes. We appreciate also the clipping from the Literary Digest of April 17th. Dean Morison has presented the problem of the education of the baker in a very able way.''

—R. H. Rodgers, Chief, Division of Vocational Teacher Training and Research.

Dry crusts at home are better than luxuries abroad. —Hindu Proverb.

# "Proteology"

## *Some Thoughts of a Milling Chemist on the Protein Question*

By Ralph S. Herman,
*Chemical Director, The Ismert-Hincke Milling Company, Kansas City, Mo.*

THE protein hysteria, increasingly evident during the past few years, has developed from a subtle, little known, and less understood phase of cereal chemistry, to a momentous factor embracing in its engulfing tentacles, State Experiment Stations, farmers, grain dealers, millers, bakers, and chemists, and has even aroused at least the curiosity of the Department of Agriculture.

The question of protein quantity is of considerable importance from a number of aspects, and economically, because of the relatively small amount of high protein wheat grown in the United States. The proportion of high protein wheat produced on each crop is, of course, variable, and the old economic law of supply and demand is persistently in evidence. Consequently premiums are generally given in order to obtain wheat above the average in protein content.

It is a fact that hard wheat patent flour is offered to the baking trade, varying in protein content from nine and six-tenths to twelve and two-tenths per cent. The two extremes as well as the intermediate percentages are being successfully converted into bread by commercial bakers. Further, baking experts readily admit that it is quite possible to produce under commercial shop conditions, a satisfactory loaf of bread from any sound hard wheat flour. It is merely a matter of controlling shop conditions and maintaining the proper fermentation period for the flour.

In the trade there is a well developed idea, somewhat closely associated with the ash factor, that the protein content of a flour is a direct index of the baking qualities and baking strength of a flour. It is thought that large quantities of protein in a flour guarantee excessive absorption, increased loaf volume, longer fermentation period, better grain and increased stability of the dough. In general it is true that the higher protein flour, providing that the protein is of the desired quality, will produce a loaf of slightly brighter crumb color and offer a wider margin of safety in the dough stage. These factors can be so altered in the milling process, as well as in the baking process, that the initial advantages possessed by the wheat from which the flour was milled can be very easily lost by the time the bread is produced.

### *Protein Controls Milling Industry*

The protein question has now developed to such an extent that the whole grain and milling industry are more or less subject to protein control. The farmers have learned from the Experiment Stations that high protein wheat will bring them a premium and are more carefully selecting their seed wheat, even though they are not receiving the entire benefit of this premium. Climatic and soil conditions, as well as tillage and fertilization, have however, a marked influence on the protein content of the wheat, regardless of the type or variety of wheat sown. The grain dealers carefully select and blend their milling mixtures to a definite protein content and sell most of their offerings on a guaranteed protein basis. At this time there is hardly a sample of wheat offered on the various Boards of Trade, particularly at Kansas City, Minneapolis, and

Duluth, that does not carry a ticket representing the protein content. Practically all of the mills attempt to blend their mill mixes to a specific protein index in an effort to produce their various grades of flour with the same protein content from month to month.

Since 1910 the larger mills of the Southwest have purchased their wheat requirements to some extent, at least, on a protein basis. At that time only a few of the larger mills operated laboratories, and those mills attempted to guide their purchases from certain districts from which they had obtained samples of wheat carrying a relatively high protein content. Following this practice, before mill laboratories were very widely installed, the smaller mills made considerable use of the few commercial laboratories which were specializing in wheat and flour analysis, and many of these types of laboratories flourished for several years. When the mad rush for protein results started in earnest these laboratories were unable to handle the demands of the trade and new commercial laboratories were established over night. Even some of the larger grain companies installed laboratories in connection with their elevators. As a natural result the facilities for making the protein determinations soon exceeded the demand and a very brisk competition between the various agencies developed. The price for a protein determination fell to a disgraceful level. Some of the grain dealers were not slow to take advantage of the conditions existing and did not hesitate to give their business to the particular laboratory returning the highest results on their wheat samples. The climax was reached by some grain dealers who carefully dried their wheat samples over a radiator before sending them to a laboratory for testing, in order that they might receive a higher result from the loss of moisture in the wheat.

### *Trade Suspicions Develop Laboratories*

It was but natural that a variety of results were reported on the same car of wheat and the trade suspicions became quite intense. As a result the Kansas State Grain Inspection Department established a state laboratory for making protein tests, first in Kansas City, and later in Wichita, and Hutchison. The Missouri State Grain Inspection Department followed very soon with a state laboratory in Kansas City, and since this time other states have established protein laboratories, such as those maintained at Minneapolis and Duluth. In addition to these laboratories the Kansas City Board of Trade maintained a referee laboratory for some time. It was during the height of this fiasco that the Kansas City Protein Referee Board, the Kansas Chemists Club and the Nebraska Chemists Club were organized, composed primarily of mill and commercial laboratory chemists, in an effort to improve trade conditions as effected by the protein test. By the active co-operation of these various organizations in their extensive collaborative work there is very little present day complaint against the inaccuracy of the results reported by the various state laboratories and the commercial laboratories.

The premium carried by high protein wheat will naturally vary over quite a wide spread, depending upon the crop year and the available quantities of high protein content wheat. The premium spread has been on the Kansas City market as high as ten cents for one per cent protein. Naturally this premium must be reflected in the price of flour. In many cases, however, this premium has been absorbed by the miller, owing to the intensive competitive basis on which the milling industry is operating, with a consequent sometimes wholesale slashing of prices in an effort to secure new business as well as to retain old business.

### *Blending Wheats to Meet Needs*

It is not an uncommon practice for the miller, under the present development of the protein "cherchez," in order to conserve more economically his available high protein wheat, to make use of at least three distinct types of wheat blends for his different classes of trade. One mix of approximately eleven and one-half per cent protein, blended from ordinary hard wheat, producing a bakers patent of ten and one-half per cent protein. This mix is used primarily for household and export trade, with a small quantity finding its way into bakery use. Another mix of approximately twelve per cent protein, producing a bakers' patent flour of about eleven per cent protein. This flour is extensively shipped to the bakery trade as well as for household consumption. In addition to these two blends, one of twelve and a half to thirteen per cent protein is used for certain customers demanding extremely high protein content flour. With the twelve and a half per cent protein wheat mix the bakers' patent flour will carry eleven and a half per cent protein, while with the thirteen per cent wheat mix, the same grade of flour will show about twelve per cent protein.

The high protein wheat produced on any particular crop is usually purchased in huge quantities by the larger mills and elevators during the early movement of the crop, and stored for later use to be drawn on as needed. This condition naturally does not tend to reduce the premium spread as the maturity of the crop advances. This spread was clearly illustrated on the 1924 crop, during one period of which, it was possible for the miller to produce and sell a one hundred per cent flour carrying a ten and a half per cent protein content for forty-five cents a barrel less than the same grade of flour carrying a protein content of eleven and a half.

### *Baking Quality Determines Value*

It would seem logical to consider that the monetary value of a specific flour should depend upon the baking qualities and characteristics of that particular flour rather than on one or more phases of analytical data. Unfortunately no method has been developed that will accurately indicate the baking qualities of a flour that may be represented by figures. The baking test remains the best criterion of baking qualities and this test is so fraught with qualifications and errors that it is as yet only reasonably accurate in specific adaptations. As before mentioned it is entirely feasible to produce real saleable bread from hard wheat flour whether of ten per cent or thirteen per cent protein, providing they are handled on their optimum phase. Shop conditions are so adverse in some instances, that it would not be practical to use a comparatively low protein content flour for, in general, the margin of safety carried by a flour of this character is somewhat limited when compared with a flour of decidedly higher protein content. The question of excessive protein content then becomes more or less an insurance factor for the baker. The above comparison relates to general practice, although it is entirely possible by the careful selection and blending of wheat, to produce a comparatively low protein flour, that will outbake or at least equal under commercial practice, a flour of the same grade carrying a much higher protein content. It is feasible that under certain shop conditions and installations and even employment emergencies that the wider margin of safety, often represented in the higher protein content flours, represent a good investment to the baker, so long as the premium is within reason but there is undoubtedly a considerable economic waste of high protein flour at the present time.

### *Uniform Flour is Desideratum*

Every progressive mill is making a conscientious effort to produce a uniform flour regardless of the protein content of the blend ordinarily employed by any particular mill. It is true that there is some conflicting theories as to what uniformity of flour means, too, but this is due entirely to varying requirements among the consumers. Some mills feel that a uniform moisture, ash and protein basis, coupled with fairly accurate color control will satisfy uniformity, while other mills are very much more interested in maintaining definite baking characteristics and color, feeling that the ash and protein content has little reflection on actual uniformity. To offset any such fallacies on the part of the miller, the average baker religiously blends two or more, often more, flours in an attempt to stabilize his flour supply.

The experience of a number of organizations who have spent considerable time and thought on the protein determination from an analytical standpoint, indicates that a variation of two-tenths of one per cent protein between the results reported by a number of laboratories on the same sample of flour, is practically the minimum of experimental error.

### *Protein Quality, Not Quantity, Is Aim*

There are many varieties of wheat available to the millers, and the main varieties, in general, carry rather specific milling and particularly baking characteristics. Climatic conditions, as well as soil conditions, have a very large influence on the quality of the matured wheat. If wheat or flour is purchased solely on protein content, it amounts merely to the establishing of certain data. It is generally considered that a high protein flour will require a longer fermentation period than a low protein flour, but the writer has seen even soft wheat flour of ten per cent protein that required a longer fermentation to develop the optimum baking results than that required by a certain hard wheat flour of twelve per cent protein. The primary interest in protein, of either the miller or baker, should be directed towards protein quality rather than protein quantity. The miller can control protein quality and baking characteristics of his products by the intelligent interpretation of results obtained by the use of accurate experimental milling and baking determinations. The economic structure of the entire milling and baking industries would be materially improved by the development of technique in the baking industry to handle flour, regardless of initial fermentation period or character to produce satisfactorily a loaf of saleable bread. Too few of the bakers are equipped to handle anything out of their long established routine in the baking of bread. By the development of methods to arrive at the optimum fermentation period of a flour and the optimum absorption it should not be difficult for the baker to produce first class bread from practically any hard wheat flour he might wish to use. His principal concern would be the obtaining of a uniform character flour from his mills. This last thought is an accomplished fact in a few instances, and has proven quite profitable.

The protein panacea of the millers seems to lie in the establishment of a huge wheat pool, in which all the wheat of a certain crop can be thrown together, blended and then parceled out to the various milling units for conversion into flour. This is, unfortunately perhaps, impossible and impractical and besides the ash bugaboo would still remain.

# Cheese Bread, A New Bread

By L. A. Rumsey,
*Trade Promotion Department, American Bakers Association*

**The amazing development of the sandwich shop has stimulated the consumption of bread among restaurant patrons. It has also created a new interest in nutritious sandwiches and made the toasted cheese sandwich the most popular of all. It is not easy to make such a sandwich and so the development of a new type of bread in which cheese is incorporated in the loaf itself offers great possibilities to the restaurateur. Such a bread has been created at American Institute of Baking.**

VARIETIES in Baked Goods have been selected by the Fleischmann Company as the most logical program on which to spend a very large advertising appropriation to attract public attention to the greater consumption of baker's products. The consuming public has become so used to the purchases of foods from all different classes, both necessities and luxuries, in such variety that it seems desirable to provide equally large varieties of baked goods for their selection.

The taste for cheese flavors has been increasing so rapidly in this country that the consumption of all cheese has increased 150 per cent in six years. While we cannot judge the probable market of America by the normal consumption in Europe it is nevertheless interesting to notice that the per capita consumption of cheese is still but four and one-half pounds as against an average of twenty-eight pounds per capita in Europe.

The cheese cake has long been a favorite in the restaurant market. Cheese crackers, cheese dainties and special cheese pastries are building a considerable market of their own. The idea of cheese in baked products, therefore, is not new. A similar flavor has been noticed in toast made from bread loaded with more than its normal content of milk.

It remained for a practical cheese technologist to work out a cheese bread formula and actually try it. And why not a cheese bread? Milk in bread has come to be regarded as the highest indication of its food quality and nutritive value. The substitution of cheese for the milk simply adds in greater quantity those ingredients which make milk so valuable.

### *Experts Develop the New Bread*

Don Ray was responsible for bringing the idea to the Institute. As one of the most thoroughly advised technical operators in the cheese industry, he has been developing the production and marketing of dehydrated cheese. When he joined the J. L. Kraft Company and took charge of their industrial organization, it was natural that he should follow the line of co-operation with American Institute of Baking established by that company several years ago in its national advertising, and seek practical advice as to the possibility of creating a new outlet for his product in a new variety of bread.

Victor E. Marx of the Institute was immediately interested and went to the experimental bakery to find out how such a bread would make up in commercial form. Repeated experiments showed unusually good results. Apparently here was a new bread which did not require special formulas nor a process dough which needed coddling or petting. The regular dough formula, with almost the same time of fermentation, carrying varying quantities of dehydrated cheese invariably produced a good loaf of bread, rich in color, high in cheese flavor, of good grain and texture. Another characteristic of this bread, and one to be expected, was its superior keeping qualities. The bread was nearly as fresh and palatable and made as good a toast a week old as when fresh.

### *Jack Gardner Gives His Aid*

To carry such a product from the laboratory into commercial acceptance usually proves to be a horse of another color, so it was necessary to try it on the public to get a more general reaction. About this time Jack Gardner, flour broker of Chicago, stepped into the picture and applied his experience with the baking industry. The commerical production of a product so different as cheese bread was recognized as a promotion problem from this point on. Arrangements were made with one of the larger tea-room restaurants in Chicago to try cheese bread toast on an unsuspecting public. Fifteen thousand people during the next few weeks were supplied with a supply of hot buttered cheese bread toast with their breakfast or luncheon and later were given a little vote card on which to express their reaction to a new flavor in bread. The result was surprising. Without exception the remarks were complimentary and many cards carried a request for further samples. The two outstanding objections expressed on these votes were for more cheese or a more pronounced flavor.

Experiments with dehydrated cheese of different intensity of flavors and different amounts showed a decided preference for a bread which contained twenty per cent of a medium flavored dried cheese.

Some Chicago bakers were next approached and now, after only four weeks' trial, a considerable volume of cheese bread is being sold to restaurants, cafeterias, tea rooms and to the public.

### *Retail Bakers Find It Popular*

The story of one retail baker is significant. He had planned to make a one-day special on cheese bread as a trial. The home managers who tried it would not consider it as a special and repeated orders came so regularly and the baker is obliged to turn out thirty to sixty loaves to supply what has become a steady demand.

As a special variety this bread can yield a profit commensurate with its high food value. One difficulty encountered by the sponsors is the fact that its popularity and the enthusiasm with which it is received endangers the carefulness and sound principles by which a new product should be extended.

The facilities for distribution of dehydrated cheese are already over-taxed with the delivery of small orders to those bakers from one coast to the other who have heard of the new bread and are trying it. If the enthusiasm with which the first loaves have been received is any indication of its market possibilities the baker should develop a growing business on a staple article whose place is in the first rank of healthful foods.

### *Its Nutritional Value Is Very High*

An analysis of this bread presents striking facts to the nutritional expert and the home economist who is interested in the health and welfare of the family group. The proteins of the wheat flour have been supplemented by those of the cheese and increased by nearly two per cent. The fat content is practically double that of ordinary bread and the fact that it is made up entirely of butter fat will not escape the dietitian. Even a whole milk bread cannot begin to compare with it.

The quantity and quality of the lime and phosphate salts in cheese bread is a real talking point in its favor, which is something to be considered in these days when our food literature so often bewails the lack of these bone and body building substances. In such bread the child can readily secure the lime and phosphate minerals to assure its safety margin on the side of health. Such a cheese bread, properly made, should be almost unlimited in its advertising possibilities. The following tables of analysis are given to show its values as campared with a standard milk bread.

CHEESE BREAD (20% Cheese)

| | As Rec'd | Air Dry | Dry |
|---|---|---|---|
| Moisture | 33.61 | 6.37 | 0.00 |
| Ash | 2.28 | 3.22 | 3.44 |
| Protein N x 6.25 | 11.48 | 16.19 | 17.29 |
| Crude Fiber | 0.56 | 0.79 | 0.84 |
| Fat | 6.07 | 8.56 | 9.14 |
| Nitrogen-Free Extract | 46.00 | 64.87 | 69.29 |
| | 100.00 | 100.00 | 100.00 |
| Calcium (Ca) | 0.118 | 0.166 | 0.177 |
| Phosphorus (P) | 0.16 | 0.23 | 0.24 |

MILK BREAD

| | As Rec'd | Air Dry | Dry |
|---|---|---|---|
| Moisture | 37.39 | 12.73 | 0.00 |
| Ash | 1.58 | 2.20 | 2.52 |
| Protein N x 6.25 | 9.54 | 13.30 | 15.24 |
| Crude Fiber | 0.18 | 0.24 | 0.28 |
| Fat | 4.25 | 5.93 | 6.79 |
| Nitrogen-Free Extract | 47.06 | 65.60 | 75.17 |
| | 100.00 | 100.00 | 100.00 |
| Calcium (Ca) | 0.074 | 0.104 | 0.119 |
| Phosphorus (P) | 0.12 | 0.17 | 0.19 |

### *Every Baker May Make Cheese Bread*

In the development of all its work American Institute of Baking has pledged itself to the benefit of the baking industry. Its findings are open to the public and use for the public benefit may be made of them by any organization or industry. All bakers are invited to try the new cheese bread in their own market and to make such disposition of it as that market requires. Only one word of warning need be suggested and that is that the customer will quickly resent the use of any but the highest grade of ingredients. Many different kinds of dehydrated cheeses are obtainable on the market and the baker must find that product which gives him the most desirable flavor.

### *The Formula Is a Simple One*

The formula and data for the commercial production of this bread are as follows:

| | |
|---|---|
| Wheat flour | 100 parts |
| Cheese | 20 parts |
| Water, according to absorption, approx. | 64 parts |
| Yeast | 2.5 parts |
| Salt | 1.9 parts |
| Sugar | 4 parts |

If it differs radically from the formula used in any shop for the highest quality of bread made, no reduction or change from the formula need be made except the elimination of other shortenings. A properly dehydrated cheese with less than three per cent moisture carries its own shortening in the form of milk fat to the extent of thirty per cent of its total weight. In general the fermentation time of a standard dough will be considerably longer with cheese than without.

### *Cheese Bread Has Many Uses*

The uses already made by this cheese bread are limited by the short time it has been on the market. It was designed primarily for toast and as such is the favorite. One enthusiastic customer told her baker that cheese bread had not found its proper place unless French toast was made from it.

Critical study of the nutritional value by means of feeding tests on cheese breads is now in progress in the Institute's nutritional laboratories.

# More About the Proteins

## *Some Recent Investigations Which Have Contributed to Our Knowledge of Bread's Relation to the Diet*

By Roscoe H. Shaw,
*Chief, Department of Nutrition, American Institute of Baking*

As Atwater in this country and Voit in Germany with their associates a generation or more ago, studied the whole list of foods purely from the chemical standpoint, so modern nutrition investigators are studying these same foods in the light of the revolutionary discoveries which have been made since that time. With no single food essential have more important revelations been made than with the proteins. Proteins serve a dual purpose in their role in nutrition. While they may also be used as sources of heat and energy their special purpose and the one which they alone can serve, is that of cell builders and repairers.

It is only comparatively recently that it became recognized that proteins differ in their value as a food constituent. As recently as the 90's of the last century the legume proteins for example, were held to be of equal value with those of meat or milk, and the assay of a food for protein consisted simply in making a nitrogen determination.

A little later digestion experiments were performed and the relative digestibility of proteins from various sources were established. The work of Emil Fischer and others threw an entirely new light on the role of proteins in nutrition and it is now understood that proteins to perform their special function must not only be present in sufficient amount, but must be digestible as well and contain the requisite number and proportion of amino acids.

### *Albino Rats Furnish Facts*

Although chemical methods for the determination of the amino acids have been greatly improved, they have not yet reached the state where they can be relied upon solely in evaluating the proteins. The albino rat which has served so well in other lines of food investigation has now been brought into service for studying the composition of the proteins, not of course as would be done in the chemical laboratory but by establishing the biological value which is a measure of the completeness of a protein with reference to its amino acid content.

Dr. H. H. Mitchell of the University of Illinois has perfected a method[1] for determining the biological values of protein with albino rats, and using this method he and others have contributed some very valuable information to our knowledge of this food essential.

A still more recent line of study has been in connection with the supplementary value of proteins. Amino acids lacking in one protein may be supplied by another so that the biological value of the two combined is greated than that of their mean biological value.

### *Nutritional Values Vary*

There appeared in a recent number of the American Journal of Physiology an article[2] by Aniela Klein, Benjamin Harrow, Louis Pine, and Casimir Funk, on the nutritive values of various layers of the wheat and corn kernels. They applied the method of Mitchell to various fractions of the wheat and corn kernel and arrived at the conclusion that the proteins of the Red dog fraction had the highest biological value, while First Clear had the lowest; Patent flour had a slightly higher biological value than the First Clear, and the Bran, Standard Middlings, and Second Clear ranged between them.

Under the title "Biological Value of Foods" H. H. Mitchell and G. G. Carman[3] report in a recent number of the Journal of Biological Chemistry some extremely interesting results on the supplementary value of the proteins of various foods with the proteins of Patent flour. They determined the biological value of the proteins of patent flour alone and in combination with the proteins of whole egg, white of egg, milk, veal, and beef. The authors give the following summary of their findings:

"The total nitrogen content of a food, rather than its total protein content, is the better starting point in its biological evaluation as a source of nitrogenous compounds in anabolism.

"The average biological value of the nitrogen of white flour obtained for the forty-nine rats in these experiments is 52.

"The average biological value obtained for the nitrogen of whole egg is 94, for the nitrogen of egg albumin 83, for the nitrogen of milk, 85, for the nitrogen of veal 62, and for the nitrogen of beef 69.

### *Biological Values Are Different*

"Mixtures of flour and egg nitrogen in the proportion of 2 to 1 were found to possess an average biological value of 75. If no supplementary relation existed between these two sources of nitrogen, the value expected for the mixture would be 66, so that the difference between 66 and 75 may be taken to measure the extent of the supplementary effect.

"Only a slight supplementary relation was found between egg albumin nitrogen and white flour nitrogen. The average computed value for a mixture of two parts of white flour nitrogen and one part of egg albumin nitrogen was 64, while the average value obtained by direct experiment was only 66. With several of the individual rats no supplementing effect was evident.

"A mixed ration containing white flour nitrogen and milk nitrogen in the ratio of 2 to 1 gave an average biological value of 71, the value to be expected if no supplementary relation existed being 62.

"The biological value of the nitrogen of a mixture of flour and veal in the proportion of two parts of flour nitrogen to one part of veal nitrogen was found to be 62, the same as that found for veal alone. The expected value in the absence of supplementing effect is 53.

"A similar mixture of flour nitrogen and beef nitrogen gave an average biological value of 73, higher than that of the beef alone and 13 per cent higher than the expected value if no supplementary relation existed.

"Comparing the supplementary relations between white flour and whole egg, egg albumin, milk, beef, or veal, it appears that the supplementary relation is greatest between white flour and beef and least between white flour and egg albumin. No distinct differences between the other animal foods in this respect appear to exist."

Dr. Mitchell's results are extremely interesting and furnish concise information on the value of milk in bread making. It is also of interest to note the high biological value of mixtures of flour with beef, veal, and egg proteins.

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[1] Mitchell, H. H., Jour. Biol. Chem., 1924, lviii, 873.

[2] Klein, Aniela, Harrow, Benjamin, Pine, Louis and Funk, Casimir, Am. Jour. Physiol., lxxvi, 2, 237.

[3] Mitchell, H. H., and Carmen, G. G., Jour. Biol. Chem., lxviii, 183.

# Food Values in Pies

### By Winifred Stuart Gibbs*

THE pie baker who is eager to increase his sales—and what pie baker is not? —will be surprised to find how far he will be able to go if he equips himself with authoritative information regarding the importance of his products as food. Such a manufacturer already knows how to turn out pies of the first quality, and has a fair knowledge as to how best to find new markets, for he is a progressive business man. Heretofore, however, his tendency has been to leave discussions about the food value of pie to the diet specialists. Suddenly he awakens to the realization that the diet specialists have something for him, something he must have if he is to continue on his successful way.

Now the nutrition specialist, when called in to confer with the pie baker, does not theorize. He does not say: "It would be very nice if you, Mr. Pie Baker, were to study the chemical composition of your products so as to know something about their place in the diet." Not he! Instead of that academic statement he says frankly: "Housewives today are being carried along on this wonderful wave of interest in foods and nutrition, and unless you can assure them in regard to the honorable place of pie in the newer diet schemes—well, I'm afraid your sales will never show a very much higher curve than they do today."

Being wise, therefore, in his day and generation, Mr. Pie Baker settles down to finding out just what information he should note in his shop handbook, for the benefit of himself and of his men.

In the first place this information is not complicated, neither is it necessarily voluminous. We may safely leave to the laboratory scientists the consideration of the numerous details involved in establishing as fact any new theories uncovered or developed in the field of diet. So the working notes for the baker on the subject of pie as food may be relatively simple.

### *Why Pies Are Nourishing*

What are the main divisions under which the facts may be classified? First, composition and food value. Second, types of persons for whom pie is a suitable food. Third, possibilities of pie as a carrier of important fruit foods. Such a classification is based on findings of the nutrition specialist as well as on what the average housewife is thinking.

In case the pie baker has been too busy to think about the main factors entering into a well-rounded diet, it is suggested that he now make a note of them as follows: first, energy; second, body building material; third, mineral salts; fourth, vitamins.

Perhaps there are some customers eagerly interested in proving nourishing food for their families, but doubtful as to pie. The baker who has learned that apple pie, for example, provides in a pound of that ever popular dainty 35 per cent of the energy required by a man in one day, 3 per cent of lime for his teeth and bones, 5 per cent of the phosphorus used in keeping his body in working order, 6 per cent of the iron needed by his good red blood, and 14 per cent of the building material for his active body, will know what to say to the doubtful customer.

Obviously Mr. Customer will not be advised to eat a pound of pie or of any other food in a day. The point is rather that if Mrs. Customer is made to realize what a rich store of body building and body regulating material is to be found in apple pie or other pie she is likely to have an increased respect for pie as a food, and the baker may look for increased orders.

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* Reprinted from the March issue of the American Baker.

Again, the exact method of getting this information into the mind of Mrs. Customer must be worked out by the individual baker. He can no more cram information into her brain than pie into her mouth. Being a clever business man, however, he will realize that knowledge and conviction concerning the food value of his products constitute a good foundation for any sales campaign. Confidence begets confidence, and the baker who knows that pie is a nourishing food and, what is equally important, knows why, stands a fairly good chance of convincing his customers.

### *Who Should Eat Pie?*

So much for the composition of pies. Next comes the question, "For what types of persons is pie a suitable food?"

Briefly, well-made pie is a suitable food for all who have arrived at an age sufficiently mature to insure mature digestive powers. Not necessarily full maturity is implied, but simply that age when there is no longer any necessity for special care as to simplicity in the diet.

Active boys and girls of high school age may be said to have reached such an age. Not that an occasional piece of pie will actually harm a younger child, but the fact remains that his desserts should be simpler as, for example, plain stewed fruit, rice pudding and the like.

The pie baker will find that his customers will have increasing respect for him and increasing confidence in his sales material if he does not try to press the merits of his products on those for whom they are not suitable. When all is said and done, active high school boys and girls and their vigorous parents offer a fine market for pies, and it is wise to concentrate on these "prospects" and their dietary requirements.

Finally, we come to the service rendered by pies as carriers of important fruits.

Here the baker may "spread himself," to drop into the vernacular. Fruits constitute one of the most valuable of all food groups and, with the help of their mineral salts, wholesome acids and vitamins, add much to the protective character of the diet.

The dietitian is ever ready to hold a brief for fruit in the diet, whether it be raw, dried or stewed, each of these having its own place. Naturally it is with the last, or stewed fruits, that the pie baker is most concerned, and if he will but store away in both his notebook and his mind a few simple facts about their usefulness as food he is likely to find them very useful in sales promotion work.

### *Fruit and Fruit Acid*

Here are some of the services fruit pies will perform in the general scheme of adult nutrition. Ripe fruits tax the digestive organs very slightly, and cooking softens the cellulose and coagulates the pectin, or jelly making constituent.

Fruit acids are burned in the body just as any other food elements. Their final products are alkaline, so that they are excellent food for those who wish to ward off rheumatic troubles.

Fruits help to change the intestinal flora and to relieve constipation. They are therefore very wholesome food for those who are troubled with putrefaction in the intestines.

The addition of fruits is one of the best possible methods of balancing the diet for iron. Cherries have a greater proportion of iron than egg white or milk.

Apples have been called a stomach stimulant, and are desirable for use in jaundice, catarrh of stomach and bowels, constipation and liver troubles.

Blueberries are a good laxative food.

Oranges are rich in lime, and although not generally a pie fruit, a little of the juice will add both flavor and food value to other pies.

Strawberries contain a gram of food lime to every ounce, and have this essential mineral salt in greater proportion than do cereals.

Citric and malic acids, found in a number of fruits, are effective germicides, the stomach being found sterile after a meal of strawberries and water.

### *Promoting Pie Popularity*

It will require only a moderate imagination on the part of the pie baker to enable him to think out ways of incorporating these and similar dietary facts in his sales promotion material. Naturally, he will not wish to emphasize disease, but on the other hand he may with propriety point out the encouraging fact that fruits are protective foods, helping as they do to balance the diet and ward off disease by contributing to complete nutrition.

The pie baker who studies his trade publications will find many suggestions regarding new markets, tea rooms, counter lunches, automats, industrial cafeterias, delicatessen shops, railroad station lunch rooms, box lunches and the like. One great point in his favor is that which might be described as the social value of pie. In other words, every good American likes it, whether he will own it or not!

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For bread do men leave household, home and country. A thousand miles away do the bread seekers dwell.

—Indian Proverb.

## *Another Apple Pie Classic*

IT IS good professional practice to set up a straw man in order to shoot him full of holes. Writing for the Chef's and Cook's Journal, Tom Marvel uses this method in glorifying the gastronomic and patriotic virtues of old-time apple pie. He bewails the passing of apple pie from Los Angeles when, as a matter of fact, the New Englanders who built California are still strong for the pie of their childhood. Here is Marvel's "straw man." Look at him and your pie appetite will demand immediate attention.

In the dim and distant future, when historians begin to check the gifts America gave to civilization, maybe they will skip the Pullman car and the pocket flask; the football stadiums and synthetic gin.

They may even pass by some musty copies of the Congressional Record in the ruined cornerstone of the Senate office building.

But if they know their business they will not overlook the humble apple pie, if that supreme culinary masterpiece doesn't become extinct before them.

Already in Los Angeles, apple pie—real apple pie—has become as shy and retiring as the coyotes which roamed the bottom lands of the Los Angeles river before the padres came.

True, there are places yet where old-time apple pie may be found, but they are few and not always easy to discover. An unassuming little sandwich bar in a downtown street; a luxurious cafeteria a few blocks away; in these two places the noble dish reigns in well deserved splendor, but such discoveries are rare indeed, and each must find them for himself.

When the first New England housewife peeled her batch of Golden Russets and placed them in her oven two inches deep between layers of expertly made dough, the creation that came out some time later bore little resemblance to its sorry looking 20th century namesake. It was the apple pie of those times that kept the soldiers' spirits up in the dark days of the Revolution. Would the Minute Men, that April morning 150 years ago, have shot so true had they not just finished a breakfast of apple pie?

But the apple pie is passing, and unless patriotic citizens take steps to save it, it will soon become as unknown as sassafras tea.

And when that day comes—to a nation already burdened with "spaghetti stations," factory-made tamales, near beer and French pastry—may every apple tree in the land droop its boughs with grief, for the foreign conquest of the American kitchen will be complete.

## Pies 'N Cakes 'N Candies for Children

SUCH a title as this will interest grown-ups as well as children, for Dr. Lulu Hunt Peters, writing in the June issue of Modern Priscilla, effectively disposes of the notion that there is something wrong about these good things. Dr. Peters is an authority on diets and her approval of the proper use of pies and cakes and even of candies as a satisfactory food for children will bring joy to every child who has a sweet tooth, as all children have. The story runs as follows:

"Eddie, a sturdy little boy friend of mine, whose mother never allowed him any sweets except honey and dried fruits, was put in charge of a friendly neighbor while his mother went on a little trip. No sooner had he bade her good-bye at the door, than he closed it emphatically, and standing with his solid little legs apart, looked up to his hostess and in a firm voice announced, 'I like cake, I like pie, I like candy.'

"It was quite evident that somewhere, some time, he had slipped mother's supervision.

"The mother of another little boy equally as sturdy as Eddie, told me that she didn't believe in this so-called scientific feeding of children; that her boy was perfectly healthy and he had a generous slice of pie every time the family had pie, and he thrived on it. When I asked her about his milk, vegetables, etc., she confessed he didn't get his pie until he had eaten those foods.

"These two incidents are evidences of the popular idea that it is unwholesome for children to have pies, cakes or candies. Now, runabout children need a tremendous amount of energy food, and well-made pies and cakes (by well-made I mean not too greasy, or soggy), and candy are high energy foods. And there's no logical reason why children from four or five years on, cannot have these articles of food occasionally, for desserts—IF they have had their full quota of growth foods during the meal."

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"Three of our officials, after reading Baking Technology, agree with me in the opinion that the articles in your magazine have a lasting value, rather than a newspaper value. The greatest part of your material will be useful for years."

—Waverly Press, Inc., Baltimore, Md.

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In political life, educated public opinion no longer responds, as in former years, to malicious attacks upon industry by shallow political leadership. No longer do men in public life condemn industry solely because of size. Success in both large and small industry is no longer preached as evidence of misconduct, and to be penalized.

—Julius H. Barnes.

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Bread is a gift from God, it is a father, a nurse. —Old Russian Proverb.

# What Does the Public Want?

By Ernest Valerius*

IN one of its latest bulletins, the U. S. Department of Agriculture made the assertion that, compared with 1879, the bread consumption in 1925 had declined twenty-four per cent, and various reasons were given as to the probable cause of this decline, such as the increased use of cereal breakfast foods, new foods, etc.

To one who has watched the rapid growth of the wholesale bakeries during the past ten or fifteen years, it seems almost unbelievable that bread consumption in the United States has declined, especially in consideration of the fact that since 1879 the population of the country has increased more than thirty per cent, and among the millions of newcomers to this country there certainly were represented the breadeaters par excellence of the old country.

But looking closer into the matter, the question loses much of its doubtful character. Most of the growth of the wholesale bread business is due to the fact that the retail bakers, almost without a struggle and with very few exceptions, gave up their former important bread trade to the wholesalers. And secondly, many of the housewives who formerly baked their own bread, are now buying the baker's product, in most cases bread made in the wholesale factory.

The paradox of a decline in bread consumption and an extension of the wholesale baking business is thus partially explained, and it remains necessary therefore to inquire as to what may have caused the large decline in bread consumption, even if we assume that the government's given percentage is altogether too high.

### *Is Rich Bread Desired?*

Two divergent causes may be given as the reason for the decline. There are many bakers, government officials and laymen who say that the staff of life as at present manufactured does not come up to the requirements of a public that is becoming more fastidious every year. That it does not contain as yet all the best there is in wheat, in short, that it is not a completely balanced ration that will fully satisfy the human stomach in its craving for nourishment. So the bakers have largely substituted milk for water as a liquid to make a dough, have added innumerable yeast improvers, malt extract, and a thousand and one different things that are offered the baker in his endeavor to produce the impossible—a bread that will be liked instantaneously by anybody who tastes it.

On the other hand, an equally numerous group, bakers as well as others, maintains that bread as at present manufactured in all the bread factories and in most of the high-class retail shops, does not deserve the name of bread any longer, but is merely a new form of cake. They point to the fact that no old-fashioned housewife ever baked bread from three-hour straight dough; that she set the sponge at night and in the morning made her dough that gave her a bread with a flavor that has not and can not be produced by any artificial means whatsoever, or by the present mode of baking.

### *Or Is Bread Just "Filler"?*

These bakers point out that notwithstanding the millions spent every year by the wholesale bakers, large and small, combined or independent, in order to boom their bread sales, they do not create enough new bread eaters to keep in line with the ever-increasing population. They claim that housewives do not expect in bread a "complete" nourishment, but merely a well-tasting and easily digested "filler," the way bread was used practically everywhere since time immemorial, until recently bakers became possessed of the idea that a slice of bread should constitute a "meal," and forthwith proceeded along this line of thought until they produced, not a meal, but a cake. And who wants to eat cake with his regular meal?

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* In The Retail Baker.

So the other side says: Go back to the bread as it was constituted fifty years ago, flour, water, salt, yeast, shortening and sugar, and perhaps a boiled potato or two, and with our modern improvements in manufacturing machinery, in ovens, in high-protein flour, we should be able to produce a loaf of bread whose very smell proclaims it to be bread, and whose tastefulness would induce the consumer to eat two slices where he now consumes only half a slice, and to sing its praises to those who have turned their backs on the baker's bread of today.

### *Both Ideas May Be Right*

Well, who is right? Both sides advance strong arguments, and it may be that both are right, that there are so many potential bread eaters in this country that it would pay to keep on producing an ultra modern loaf and sell millions of it every day; and also make a really old-fashioned bread according to old-fashioned long-time fermentation ideas, using in both cases really high-class flour and the best of other materials; advertise each kind extensively according to its true merits, and perhaps the next time the government publishes statistics about bread consumption in the United States, it may have to state that bread consumption has increased twenty-five per cent. Who knows?

## *The Great American Pie*

The great American pie stands without a rival. Furthermore, it is so wrapped up with sentiment that purveyors of food display it for its psychological effect. It is said that if an American man but sets his eye upon the crisp, flaky, brown surface of a pie, he waxes sentimental and is made tender and happy with thoughts of home and mother.

And there is no gainsaying the direct appeal of a real pie. Can any man gaze on the warm, glazed surface of a newly baked apple pie and not feel the anticipatory pangs of a consuming hunger that can only be assuaged with a piece of that very pie? Can any red-blooded man see a pumpkin pie sitting proudly in the place of honor at the Sunday dinner table, fragrant and golden-brown, without feeling the ambition to eat the entire pie himself?

And well they may say it's a man's dish. It is. Let the women have their teas, their macaroons, their toasted sandwiches of fragmentary proportions, but give a man a cup of coffee and a piece of pie. And if you must give him something better —give him two pieces of pie.

No New England breakfast is complete without pie, no Thanksgiving dinner is complete without "punkin" pie and no Christmas dinner without mince pie. We are a nation of pie-enthusiasts. Let not the art diminish. To let such a noble branch of human endeavor as pie-making die an ignoble death would indeed be a public shame. Let us petition congress to appoint a great pie-commission whose duty will be to guard, preserve and perpetuate in all its gastronomic glory, the great American pie.

—Meridian Record.

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If bread is upon the table, then the table is a throne; but if there is not a bit of bread upon it then it is only a plank.

—Old Russian Proverb.

## *Food Habits and Sandwiches*

THE development of the sandwich habit and the astonishing popularity of the sandwich shop is being given much attention by restaurateurs. In a recent issue of the American Restaurant, G. V. Kenton, Director of the Civic News Bureau of St. Louis, reports an interview with hotel chefs and cafeteria operators. He says in part:

"People are now eating more vegetables and less meat than formerly. This is true of all except the younger generation, who seem to have gone sandwich crazy."

Another cafeteria proprietor, who daily sees thousands lined up at the shining brass rails in his place and march along with their trays, said:

"Our toasted sandwich department has had a remarkable growth. We can scarcely supply the demand in the rush period at noon. A good deal of this trade comes from women and girls, who eat more daintily than the men. It seems to be the fear of most women that they will become too fat, so they choose the things they believe will keep them from gaining weight. Consequently they are our best patrons for sandwiches and salads."

## *Humbug Diet Lists*

"WHEN I entered upon private practice," writes Dr. William Brady in his excellent column, "The Ways of Health," "I remember how soon I was imbued with the total depravity of starch as a food material although I had never heard a derogatory word in reference to this great fuel food in all my medical studies.

"It seemed that the proprietary food and medicine manufacturers had decided that starch or foods containing starchy material must go, and with the well misinformed layman it was a fatal mistake for a doctor to permit a starchy food to get into the 'may eat' column. Starch created gas, gas indigestion, indigestion nervousness, and nervousness led straight to a sanitarium.

"Those old diet lists prepared in the halcyon days when doctors wore van dykes and traveled in buggies, were constructed almost wholly upon empirical grounds, queer fancies or prejudices such as the one about starchy foods. The science of nutrition had scarcely got started, calories were generally assumed to be something between corporals and colonels in the marines, and vitamins, if they existed, managed to elude capture.

"Today such 'diet lists' are used mainly by humbug dealers, a few broken-down medical practitioners who have become the tools or unpaid agents of aggressive proprietary interests, and an occasional mail order 'health institute' in the lucrative business of practicing long-distance medicine without a license."

## *The Staff of Life*

A quarter of a century ago the American household that did not produce its own bread was the exception. In 1926 about two-thirds of the bread comes from the bakeries. The reason is clear. Good bread is not created by haphazard, hit-or-miss processes. The bread that mother used to make, with cunning plus inspiration, cannot be extemporized by a young housewife whose kitchen is only a den of menial drudgery which she desires to evade.

We devour in the United States today about twenty billion loaves of bread a year, of which twelve billion are produced by the bakeries. The official estimate puts the daily consumption per capita at half a pound. No food is so universal. There are cycles of change in diet, but bread in some form remains the final touchstone of the success of a good cook.

—Philadelphia Public Ledger.

# Books for the Baking Laboratory

Several of the publications of American Institute of Baking are now available for general distribution. These booklets and leaflets are reprints of articles which have appeared in Baking Technology or have been written to meet a special need in the thought that they will be of help to the baker who wishes authoritative articles discussing his products for distribution among his patrons, in schools or at public meetings.

The series now available is described below. Orders should be accompanied by the price as indicated and should be addressed to American Institute of Baking, 1135 Fullerton Ave., Chicago:

THE BREAD OF LIFE. By Dr. E. V. McCollum of the Johns-Hopkins University.—This 12 page pamphlet discusses the role of bread in the diet and is an emphatic answer to the critic who takes the position that white bread should not be eaten. $1.00 per Hundred, $10.00 per M.

DIGESTIBILITY, ROUGHAGE AND VITAMINS. By Dr. Walter C. Alvarez of the Hooper Foundation for Medical Research.—In a six page pamphlet the author points out that much of the present crave for rough foods is a fad and that in many cases illness may be attributed to the use of indigestible breads. $1.00 per Hundred, $7.50 per M.

THE TRUTH ABOUT FOOD FADS. By Dr. Agnes Fay Morgan of the University of California.—In a three page leaflet Dr. Morgan effectively disposes of the common statement that starchy and acid foods must never be eaten together, and points out that no food which is good in itself is rendered harmful by combination with other foods. $1.00 per Hundred, $8.00 per M.

MODERN BREAD.—This four page leaflet, prepared by the Department of Nutritional Education, discusses the quality of baker's bread, the nutritive value of milk bread and whole wheat bread, and suggests uses for bread in forms not ordinarily employed. $1.00 per Hundred, $10.00 per M.

BREAD. By Dr. E. V. McCollum of the Johns-Hopkins University.—In this four page reprint from Baking Technology, Dr. McCollum discusses the fallacy of the reasoning that whole wheat bread is more wholesome than white bread, and emphasizes the fact that successful nutrition is determined by a proper choice of food. 75 cents per Hundred, $5.00 per M.

FOODS THAT GIVE HEALTH.—This eight page pamphlet, prepared by the Department of Nutritional Education, is a concise discussion of the different types of foods and the roles they play in adequate nutrition. While each subject is discussed but briefly the several paragraphs devoted to milk, meats, fruits, breads and the vitamins are complete in themselves and offer the reader the latest nutritional ideas. $2.00 per Hundred, $14.00 per M.

BREAD AS THE PHYSICIAN SEES IT. By Dr. Morris Fishbein, Editor of the Journal of the American Medical Association.—This booklet is a reprint of the address made by Dr. Fishbein at the Buffalo Convention of American Bakers Association. It is the most comprehensive discussion of bread from the medical point of view which has yet been printed. While it has already been given wide publicity, it should be placed in the hands of every physician, dentist and dietitian. $1.50 per Hundred, $10.00 per M.

REPORT OF FIRST ANNUAL PIE CONFERENCE.—This 84 page mimeographed book is a complete report of the important conference of pie bakers held at the Institute in February. $1.50 per copy.

REPORT OF SECOND ANNUAL TRADE PROMOTION CONFERENCE.—This report is the full proceedings of the Conference held at the Institute in February. The book contains 245, 5½x7¾ printed pages and is fully indexed. $2.00 per copy.

PROCEEDINGS OF THE CONFERENCE ON CAKE BAKING.—This book of 245, 5½x7¾ printed pages, illustrated and fully indexed, is the complete report of the Conference of Cake Bakers held at the Institute in February, and contains information of great value. $2.00 per copy.

## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Some factors influencing the strength of wheat and flour.** J. S. Remington. Ind. Chemist 2, 35-8 (1926).—The writer's methods for determining wet and dry gluten and method of testing stretch of gluten are given. Method of testing the flour by making a dough of flour, $H_2O$ and yeast is described.

Ruth Buchanan.

**Effect of fine grinding upon flour.** C. L. Alsberg and E. P. Griffing. Cereal Chemistry 2, 325-44 (1925).—Over-fine grinding of flour reduces the baking quality. The authors sought an explanation of this by determining the effect on cold water extract of the flour, the rate of diastatic conversion of starch in flour, the effect on quantity and quality of gluten washed from flour, and the extent to which overgrinding injured the baking strength. They found that overgrinding injures the starch granules so that a part of the starch swells and disperses when the flour is doughed. Cold $H_2O$ extract is increased because of the dispersed starch. There is increased diastatic starch inversion and consequently an increased initial rate of fermentation follows. Severe overgrinding injures flour for baking purposes despite increased absorption due to swelling of starch granules. Evidence is presented that it also injures the gluten. Moderate overgrinding may injure the starch granules without much affecting the gluten. In 1 flour examined, absorption was appreciably increased without a material effect upon the baking strength.

Ruth Buchanan.

**The nutritional deficiencies of whole wheat flour.** E. M. Nelson and W. H. Strowd. Northwestern Miller, 145, 896 (1926).—Authorities are quoted showing that wheat and other seeds are deficient in Ca, P. Na and Cl as well as vitamins. It is scarcely practicable for a man to eat enough leafy foods to enable him to succeed with a strictly vegetable diet. Lack of sufficient Ca is one of the most important deficiencies in such a diet and a great abundance of leaf is necessary to supply this element in adequate amounts. Self-rising flour contains approximately 9 times as much Ca and 2.25 times as much Phosphorus as entire wheat flour. Foods prepared from self-rising flour will help eliminate deficiencies in the American diet.

L. H. Bailey.

**The action of vitamins A and B on unbalanced dietaries.** S. Ederer. Biochem. Z. 158, 197-202 (1925).—Vitamin B has a favorable influence on protein and carbohydrate assimilation on diets made up of one or the other of these foodstuffs. On fat-rich diets vitamins A and B must be present to enable rats to survive. Yeast is more effective than cod-liver oil in aiding animals to maintain their weight on these unbalanced dietaries.

F. A. Cajori.

**Determination of the ash content of flour.** A. Goske. Z. Nahr. Genussm. 50, 428-9 (1925); cf. C. A. 19, 3327.—1.5 grams of finely powdered pumice is calcined in a small platinum dish, cooled, and 0.8-1.0 grams flour is added. After moistening and stirring, the mixture is heated over a low flame, then over a stronger flame and finally in a muffle furnace. The dish is cooled, weighed, and may be used for a second determination.

W. J. H.

**Some variable factors of bread production.** C. G. Harrel. Cereal Chemistry 3, 1-18 (1926).—Trouble in bread making is due not to flour but to certain variables not properly controlled. Absorption, correct panning, time and speed of mixing and temperature of the finished dough are factors to be watched carefully. Fermentation is the most important single factor in bread production. Factors affecting fermentation vary according to whether there is a straight or sponge dough. A scientific discussion of fermentation of both doughs is given. The action of acids in the dough is of great importance. From a bread-producing standpoint this necessitates a classification of the dough ingredients into (1) factors resisting an increase in acid formation, the buffer value of the dough; (2) forces tending to overcome this buffer value, chiefly the yeast and acid accelerating salts. Measurements of these factors are given.

Ruth Buchanan.

**Should flour be artificially bleached and matured?** Javillier, Ann. fals. 18, 580-95 (1925). —From a detailed discussion of the various bleaching processes and the action of the bleaching agents on the constituents of wheat flour, J. concludes that: bleaching does not meet any physiological requirement of the consumer; it might allow of increasing the % of extraction and the nutritive value of the flour, at the same time meeting the present demand for white flour; some advantage might be obtained from the maturing effects of bleaching and from the improved keeping qualities of the bleached flour, but these two points would require further study before a definite conclusion could be drawn; the main disadvantage is the destruction of vitamin A, and to a lesser extent the possible formation of toxic decomposition products, but the latter is not likely owing to the small amount of bleaching agent used. Regulations limiting bleaching are suggested.

A. Papineau-Coutre.

HOME ECONOMICS DEPARTMENT
UNIVERSITY OF ILLINOIS

## *Pies and Cake Forever!*

PIE is essentially an American dish. Until recently it shared in certain quarters at least, the characteristic derogation that has often been directed at some of our national products and customs. Forgetting how our Yankee forefathers included pies as the veritable basis of their daily diet, the critics have sought to impugn this widely eaten American product and to assail its use. The dictionary has long defined pie as “prepared food baked either between two layers or crusts of pastry or with only an upper or lower layer.” The almost infinite variety of combinations with fruits, meats and what not that the use of flour in the ready-to-eat form of pie permits has served greatly to enhance the popularity of the edible food. Of course, there are pies and pies; yet the diversity of pastry cooks and their unlike talents scarcely warrants the unfortunate repute that pie has acquired in many quarters. Foremost is the charge of indigestibility; but why the combination of flour with fat and fruit should preferably be in the form of bread and butter with apple sauce or fruit jam rather than as delectable apple or strawberry pies is difficult to fathom. At any rate, the experts or “food specialists” seem to be showing a change of heart and a revision of ideas. Cake likewise seems to be coming into its own. A recent writer has justly insisted that cakes are real foods. They should not be regarded solely as confections to tempt the jaded appetite, but for what they are—good sources of food essentials. To the charge that cakes are too “rich” for many persons, it should be noted that as a general average these products contain 1,500 calories to the pound, or only 25 per cent more than the average bread. If we translate a culinary blend of flour and eggs with butter, fruits or nuts into terms of foodstuffs, the answer indicates proteins, fats, carbohydrates, mineral nutrients and vitamins. A slice of bread and butter is almost twice as rich in fat as “gold cake” or “devil's food.” The day of reckoning has arrived. American pies and cakes will survive the ordeal of dietary criticism.

—From the Journal of the American Medical Association, June 5, 1926.

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## *Works of Art*

A GLANCE at two beautifully lithographed posters which have been prepared for the American Institute of Baking, and copies of which have been sent to us, recalls to the mind the opening chapter of Sir Walter Scott's “Bride of Lammermoor,” which is partly an autobiography of Richard Tinto, devotee to art, and partly a discussion between the author and the painter on the relative merits of the pen and the brush. Each plumbs the depths of his profession in its defense, but we are aware that the combination of the two is the most powerful form of impression known to man. That there is something wonderfully appealing to our every emotion in the ingenious mixing and blending of color by the artist is very true, but by the elaboration of the understanding pen, the theme is subtly yet forcibly driven home where it might be otherwise wasted or confused. Thus in one of the posters we are given the pleasing spectacle of a dark background which throws into striking relief a bowl of luscious fruits, a glass of creamy milk, and the pure white, delicate yellow and rich browns of appetizing bread and butter, inscribed with apposite and commanding health and nutritional phrases. The American Institute is to be congratulated on a magnificent piece of work. . . . . .

—From “Milling and The National Baker,”
May, 1926. Liverpool, England.

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BAKING TECHNOLOGY

*A Journal of Applied Science in Baking*

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# Under Spreading Banyan Trees

LIKE a tree knowledge grows. It is a living, constructive force and the rapidity of its growth, the beauty of its development, the stability of its structure, is determined by its environment and the fertility of the soil in which its roots sink deeply. In the forests of India the Banyan tree lifts its crown to the sky, but its limbs turn downward to the ground and themselves root and form trunks around the parent tree. In the course of years scores of these trunks support the giant canopy and long after the original stem has gone the tree flourishes in undiminished vigor.

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Knowledge is just such a spreading tree. And the new knowledge of nutrition is a perfect example of the tree of life which constantly sends down new roots and gathers fresh power to sustain the sheltering structure. In the Calcutta botanical garden a single Banyan tree has more than three thousand trunks among which seven thousand people can stand. But under the canopy of the tree of nutritional knowledge the whole human family finds friendly shelter. Year by year new trunks are formed and new branches reach out. So today, around the original tree, the instinct which led primeval man to seek his food in the forest, stream and field, has grown a host of new trees, larger, finer specimens and every one providing additional protection to the race of man which lives by its bounty.

### *Chemistry Is a Supporting Trunk*

Among the many trunks developed from a root dropped down from the original tree is that of chemistry. The knowledge of nutrition, even in its early forms, is new. But a few hundred of the countless years mankind has been struggling upward through primordial forms, to savagery and to its present state have known anything of food save that it tasted good, that it relieved hunger, that it gave strength and vigor. When chemists began their excursions into fields of new service their interest was centered about the discovery of elixirs of life and of the transmutation of base materials into gold. And but recently have they come to realize that life's elixirs are found only in foods and that the greatest of all transmutations is the change of bread and milk and fruit and vegetables into the precious substance of a happy child.

But today biological chemistry is the most productive of all the fields of chemistry and hundreds of workers are gathering there the knowledge which will so surely benefit all the generations which are to follow us.

### *Medicine Lends Its Help*

In this age of preventive medicine the important thing is to discover the reason for disease. In other years the physician sought a cure for scurvy, rickets and all other ailments which descended on man like a scourge. Today he hunts the source and finds it not in the retribution of the gods, but in some violation of the laws of nutrition. And so, using the knowledge supplied him by the laboratory of the chemist, the physician finds that health can be assured by adequate nutrition and that sickness is followed by health when proper diets supplant those ill chosen. A bottle of milk is the foundation of health for children and in a loaf of bread are those substances which build healthy bodies and a vigorous race.

Malnourished children are still too common in every school. Underweight and all the other bad results of ill chosen and inadequate diets can only be corrected and avoided by proper foods.

### *The Support of Sound Teeth*

Good teeth, free from caries and solidly fixed in their sockets, are, like every other part of the body, built by food. Until recently the dentist has told his patients that the condition of their teeth was influenced by the food they ate, but within the last few years the dental profession has accepted the fact that it is not the day by day eating habits of the patient which make his teeth carious and unsound, but rather the character of the food of his earliest childhood and, farther back than that, of his mother before he was born. Tooth structure depends not only upon an adequate amount of lime and tooth building material, but upon the proper laying down of the mineral substances in solid, compact form, and this is determined not by the amount of lime in the food but rather, as the Mellanbys have shown, by essential vitamins. And so the dentist is one of the substantial trunks supporting the tree of life.

### *The Teacher Is an Important Trunk*

Sound minds and the attributes which make for good citizenship are acquired in the school room. Each year the teacher plays a more important part in molding children for finer citizenship. Within the past decade her influence over the child has broadened until she is no longer interested merely in teaching facts and figures. The modern teacher studies the child as an individual. His health and his mental characteristics are just as important as his ability to learn, and all are directly related to the food habits.

Undernourished children are physically unfit and so become mentally weak. The hungry child cannot learn. The body must be fed as well as the brain. Recent studies have shown the too common inadequacy of children's breakfasts. The lack of good food before school is in part taken care of by the mid-morning lunch, and one of the finest developments in the nutritional field has been the stressing of the necessity for a mid-afternoon lunch in order that the child home from school may have the energy required for long hours of play and active exercise before supper time. The modern teacher cannot properly appraise the physical condition of her children and suggest means for improvement unless she is a student of nutrition, and so her efforts for the younger generation constitute one of the important trunks of the all-covering tree of nutritional knowledge.

### *The Support of American Home Economics Association*

Among the sturdy trunks of the Banyan tree whose grateful shade protects teeming millions, none has had a more vigorous growth nor furnishes more substantial support than the group of scientific workers who teach the application of adequate nutrition and who through sound research are rapidly clearing away the mass of misinformation in which the whole subject of food and nutrition has been entangled. Twelve hundred members of this group spent a week in Minneapolis the last of June at the Nineteenth Annual Meeting of American Home Economics Association. They came from every state in the Union to learn from each other, to crystallize their teaching methods into more approved forms, to secure the latest information in the nutritional field.

The work of the Association was divided into sections and subdivided into committees. There were section meetings for home makers, home economics education, and food and nutrition. In the food and nutrition section authorities met to discuss the malnourished child, and the training of teachers in the field of nutrition received much attention. Students are working on nutritional problems in university laboratories everywhere. Many of the products of these laboratories in the form of seven-minute papers were presented for discussion and in more than one case were a distinct contribution to our knowledge of nutrition. Throughout the entire program the importance of proper food was stressed. Dogmatism has been succeeded by open-mindedness.

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## *Praise for Our Posters*

WE WERE delighted to receive your letter in which you enclosed two posters which you have just produced under your Department of Nutritional Education.

We have purposely deferred replying until we were able to get some idea of their reaction, and we think they are quite the most effective posters that we have seen in connection with the development of bread sales.

We think you, as well as the artists and lithographers, are to be congratulated in producing posters that are not merely educative, but which by the merit of their own artistry draw public attention to them.

We shall always be pleased to see anything that you produce on these lines, and we would like to thank you for sending us along the two specimens which we think are extremely good.

—The United Yeast Co., Ltd., London.

## *Doughnuts and Chowders*

THE old-time dishes have something more than solid nutritive qualities to endear them to the hearts and stomachs of hungry men. There is a poetic quality in an old-fashioned doughnut and a shore dinner of clam chowder which makes the ordinary editor a first violin in a dietetic orchestra.

After a visit to the scenes of his childhood, somewhere, we surmise, up in Vermont where the Coolidges have been building strong men for generations on a diet of pie and beans and doughnuts, the editor of the South Bend News-Times produced a prose poem in which he condensed the longings of his disappointed soul after a fruitless search for New England doughnuts in an Indiana restaurant.

And like every other man who can no longer flavor his food with the zest of youth or tempt his jaded appetite with the aromas of the kitchen of his boyhood he blames the baker for his sorrows.

"The Association of Bakers has noted, with some sorrow, the passing of the American doughnut.

That, we feel, is certainly an excuse for great lamentation, for if the doughnut—and the New England pie-for-breakfast custom—have passed, something virile has gone out of our lives.

We have long had some suspicion that what the bakers fear is true. The doughnut, in late years, has been masquerading in other clothing.

When we were boys, a doughnut was a doughnut. It was not twisted into fanciful shapes, nor filled with creams or custards or crushed fruits. It was not sugar coated. It was a solid, substantial food and, as with pie, we ate it with cheese.

The first onslaught on the doughnut came through the media of the so-called 'raised doughnuts,' which were puffy (and tough) and which carried a rather generous coating of sugar. They were soggy, which the real doughnut was not, and they carried an excess of fat.

Then followed all these modern imitations and variations, until, we fear, the modern generation scarcely knows what is and what is not a doughnut.

As cooked in New England, the doughnut was not the indigestible affair it has been painted. It could be eaten hot, right out of the kettle, without serious damage to the internal organization. And a 'batch' of three dozen would last approximately twelve hours under the combined attack of three young boys.

It is, we fear, the bakers who themselves have been tampering with styles in food, and who are dictating our tastes. We are beginning to have as little to say about what we eat as we have about what we wear.

The old-fashioned clam chowder, for example, isn't what it used to be. Some chef, probably a Frenchman, did a very evil thing one day, when he introduced tomatoes to the confection, and eliminated the milk. Tomatoes are all right in their place, but to put them in a clam chowder borders on sacrilege.

Somewhere the thing must stop. A Society for the Preservation of American Cookery Institutions might be organized. Or we might have Doughnut and Chowder clubs with weekly banquets at which these edibles alone should constitute the pieces de resistance.

Or we might pass a few more laws to the effect that any person or persons in cookery who shall in any manner depart from the old-fashioned method of cooking doughnuts, whether in size, shape, color, or composition, shall be guilty of a misdemeanor and subject to fitting punishment therefor—such as boiling in oil, for instance."

## *An International Flour and Bread Conference*

THE problem of improving the quality of flour and bread is world wide. In an effort to bring about the closer co-operation of research workers and millers and bakers an international conference will be held at Prague, October 10-12. This conference has been organized by the Research Commission for the Production of Flour and Bread and the Czechoslovak Society of Engineers and Architects.

The program which has been arranged is of great interest to every worker in the cereal field and should attract many visitors from the United States and other countries.

The first conference will discuss the nutritive value of foods made from flour with special reference to the influence of the baking process on the quality of bread and as well the influence of gluten, fats and other substances found in flour and the effect of milling processes on types of flours. This discussion will be continued at the next conference and will then develop the effects of the several milling processes on improving and stabilizing the baking qualities of flour.

Special attention will be given to a discussion of the effect of storage on grain, types of storehouses, influence of temperature and humidity and the moisture of the stored grain.

One important feature of the conference will be the opportunity for the discussion of plans for organizing a common council of editors of bulletins and technical reports and the adoption of standard forms and sizes for such material. If the plans of the conference are carried out one of the results will be the establishment of a Central Editorial Council for the purpose of publishing a Bulletin.

Dr. Francis Hruska, a Chemical Engineer of the State Institute for Food Research at Charles University in Prague is now in the United States enlisting the support of our milling and baking industries. At a recent visit to American Institute of Baking he found a keen interest in the conference and expressed the hope that the staff would contribute papers and take an active part in the program.

## *China Leads in Egg Products*

CHINA is the principal factor in the world trade in egg products, both liquid and dried. It supplies 90 per cent of the total world exports of about 60,000 tons, which is roughly estimated as the product of 100,000,000 dozen eggs. The United States takes about 25 per cent of the exports, the remainder going to the European countries and Japan.

The manufacture of egg products in the United States has not become an industry for the simple economic reason that the cost of production is too great to permit of profitable competition with China, and this despite the export duty imposed by China and the import duty imposed by this country. With eggs selling wholesale at ten cents a dozen, or less, in China, and skilled factory labor obtaining wages ranging from $9 (gold) a month for women workers to $14 (gold) a month for men, successful competition is pretty much out of the question. Be-Besides, the demand for such products in the United States is comparatively small. Frozen eggs for bakery use, however, are the nearest approach to competition that this country has with the Chinese product. This commodity is a by-product of most of the big egg-distributing centers throughout the United States.

Bread made from coarse flour is little palatable. —Old Latin Proverb.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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JULY 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Happiness*

YOUTH has roseate hopes for the future, old age recalls the past, but we live in the present, and it is the present that counts. Living in the present demands not only the action of today but a plan for tomorrow; not only hopes for tomorrow, expectations for tomorrow, but a certain plan for tomorrow, based on past experience, present possessions, and ambition.

"Take no thought for tomorrow, for tomorrow will take care of itself," means if your plan of life is to be successful you will be so busy today doing today's work that you will have no time to *worry* about tomorrow's efforts. Tomorrow's work cannot be done by staying awake tonight thinking about it, but rather by being wide awake tomorrow working at it.

Happiness, which is sought by all, is found on a certain straight line which is the shortest distance between two points, named respectively "Desire" and "Fulfillment." Fulfillment is the end of the Happiness Road. That is why the philosopher said "Hitch your wagon to a star," the unreachable, and then you'll always be on the Happiness Road. Fulfillment brings reactive depression and until fresh desire arises—discontent. But along this straight line, or highway called "Happiness Road," there are many cross-roads, by-ways and lanes, each one of which has an attractive approach, with inducing and beguiling signs. The real names of some of these lanes and by-ways, though they are effectually disguised, may be found among the following: Ignorance—Fear—Worry—Doubt—Envy—Jealousy—Prejudice—Laziness. It is not often that a guide is needed for a traveller who is on a straight road, but so seductive and fascinating are the approaches to these by-ways that there are many who lose the "Happiness Road" thereby.

One of the best guides for the business man is his "Trade Association" and fortunate indeed is the man who realizes this early in his business career.

With the American Bakers Association for his guide, Baking Technology for his reading, and the American Institute of Baking at his side with scientific counsel and practical help, the American Baker has no excuse to lose his way on the "Happiness Road."

L. J. SCHUMAKER,
*President, American Bakers Association.*

# *Only a Loaf of Bread*

THE citizen of old Italy who wrote, "from bad bread, an ignorant doctor, lightning and storms, Lord, protect us," had very clear ideas of what was good for him. His assortment of evils to be avoided was well selected. His judgment has come down through many centuries and is as acceptable today as when it was first declared. Lightning is less of a terror since

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we learned to harness it to do our work and storms beat impotently against the walls with which we drive back the elements. Bad bread and bad doctors were fitly coupled as enemies of the public welfare. It is our good fortune that we do know more about good bread now and that doctors are more skilled in the art of making sick people better and in keeping well people well.

And yet it is a bit surprising to look back through the ages and find that our real progress in bread-making and in medicine did not begin until a few generations ago. Indeed the science of the baker and the physician dates back no further than the years when Pasteur was studying the nature of ferments and proving the correctness of his ideas of the germ theory of disease.

And it is within this generation that the finest work has been done both in the development of better bread and of better medicine.

One has come chiefly because of the demands of what we call, for lack of a more simple phrase, nutritional education. The other has grown out of the labor of the scientist working in laboratory and hospital.

Both are proving their great value in developing a stronger race and in lengthening the span of life.

The two chief obstacles in the path to even finer results in both these fields of splendid service are on one hand the lack of appreciation by the baker of the fact that he is more than a craftsman, and on the other the too common failing of the physician to continue his studies after he acquires his first license to practice medicine.

The failing of the baker will be cured in some measure in another generation for the young men who are taking over the business of their fathers have more than a dough trough vision and they are seeing real opportunities opening before them to earn recognition as the first of the servants of the hungry world.

But it is more difficult to predict the time when the medical profession will realize as a whole that science advances and that the lessons of the classroom soon become hardly more than incidents in the history of medicine. Today the most serious bar to the opening of the fallow fields lying before the nutrition workers is the unwillingness of the group which hands down nutritional information to mothers and nurses and the public generally to forget all it learned of food values in the classrooms of past decades and adopt what McCollum has so aptly called the newer knowledge of nutrition.

The science of nutrition is still experimental. Its terms are not definite. Its principles are changing. The rules set down ten years ago as sound practice are cast aside today as quite inadequate. Indeed the whole subject of nutrition is so filled with theories that the wisest among the authorities are very chary about expressing positive opinions as to the correctness of many of the facts which for years have been taken for granted.

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## *Judge Gary Says:*

"The average man talks too much. It is well to let the other man talk half the time. In an extended discussion the experienced and wise man, if he is a good listener, is able to determine with considerable accuracy, something of what is in the mind of the other man."

"There is an abundance of room at the top. Never in our past history have there been such fine opportunities for success in business. It is up to every man to succeed or to fail. There is no good excuse for failure."

# Women's Message to Bakers

## *Their Status in the Economic Life of the Nation*

By Alice Ames Winter*

IF I were in the industrial world I should not want to be making chewing gum and I should not want to be making perfume. I should want to make something closely related to the really big job of living, of wifehood and motherhood and the homemaker's calling so closely related to the matter of living, as I think you are. The Doctor this morning said that he was engaged in keeping people out of heaven as long as possible, and in Chicago. I claim that we Club women have even a bigger job. We are trying to make a heaven here on earth, whether it be in Chicago or any other place. We are so closely related to the women of the household and home who are creating the primary industry that serves the household that I am very glad to be able to say to you a word of my side of the question, a little about what seem to be the changes that are coming over the American household today.

### *A Parable of America*

Shortly after the war a young American who had been an aviator told me this story. He said that sometimes, in his first battle, an aviator does not see his enemy. He has been so trained to concentrate on his own machine that that is all he is aware of. And so it happened in a certain battle that six Englishmen were attacked by 23 Germans and one of the young Britons who was flying for the first time saw his fellows begin to go through their maneuvers, so he did them too. And when he got back to the flying field he said, "Well, that was a jolly old flight we had, wasn't it?" And the others said, "That wasn't a flight. That was the worst battle we have ever been in"—but he did not know it.

The story it seems to me might be a kind of parable to America and particularly to us women. We did not know that our own little private home machines, with all the hum they made, were related to the great world job. But it appeared to us that they were, and that teaching has resulted in a new point of view toward the home. During the war we learned that the home was not an isolated thing, but that it was a unit out of which society was made. The greatest menace to America is the drifting individual, who has no deep roots anywhere. The home is the unit out of which society is made, and the heart of the home is the woman. And we saw our job in a new light.

It was no longer true that the Englishman's home was his castle. The government was touching the home on every side, and in return we women asked the privilege of touching government, and that is the new relation of the home today. We saw every one of the details of our occupation, the way we spent our time, the way we spent our money, the way we spent our energies, as matters of national import. We saw the home not as a little isolated group, but as a breeding place for citizenship. A woman lived next door to me who wore such gorgeous clothes that I always noticed them. And one day it happened that her little boy was run over, and my husband and I ran out and picked up the child and carried him into the house. And even before we undressed him I could not help noticing that there was not a picture on the walls, in fact, nothing in the house suggested harmony. And when we undressed the baby, in every one of the folds of his little body there were bits of fluff that showed he had not been bathed regularly as he should. And my husband said, "That woman is a traitor. The money that goes into her hands she is using for silks and laces and jewels instead of the things which go to make up a home, and that is as treasonable to the country as any other kind of treason." Now no man can go out from a home like that and believe in the home, and no child can grow up in a home like that and have any ideals, or confidence in the country he is asked to serve.

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* An unpublished address before American Bakers Association, September, 1921.

### *The Rulers*

Now I represent a group of women who are pretty close to you because they are the average women of the United States, the two million club women who are not erratic. They are not given to one particular fad. They are not single minded. They come from every group in America. They come from little farms afar off. Some come from great city clubs, there are rich and poor, college women and uneducated industrial women and women who belong to that class we used to call "ladies" but who we now call "parasites." Every type is in this group, and therefore they represent the great average mother, wife, household administrator of America as perhaps no other group does. And so what they are thinking today is mighty pertinent to such a job as yours.

Now the home has gone through a great many phases of development. You remember that Kipling describes the beginning of housekeeping as the time when all the world was wild, and man was the wildest of all. And women told him she did not like his wild ways, and she picked out a nice dry cave, and hung a dried skin in front of the door, and said, "Wipe your feet, dear, when you come in and now we'll keep house." Ever since that time there has been a constant change in the physical aspect of the home. We sometimes consider the apartment house a new thing, but all you have to do is see these mountainous apartment houses of oldest civilization, the homes of the cave dwellers, to know that in the beginning of time there was the same problem.

### *Passing of Home Labor*

There are all kinds of things people fear are disintegrating the home, but whatever the physical change, if we keep the spirit of the home we will have the home. It does not make any difference whether that home is on a lonely prairie or down in the slum of a great city, if the central element in that home is an ideal it will fulfill its function and make itself a breeding place for citizenship. That's a very essential thing for us to remember with regard to such a business as yours.

More and more all the physical work of the home seems to be taken out of the home. We no longer make shoes, or weave cloth, and less we are doing some of the things that have hung away behind the others. Those things are passing out of the home, and some people feel that the home is going to pieces.

I have been called an optimist because those things do not seem to me the big things. If we keep the soul nothing else makes much difference. We are coming back to an old kind of simplicity. My memory goes back to a kind of simplicity of two generations ago. When I was a little girl there was a certain woman in Boston reputed to be the wittiest woman in the city, and so when I knew my mother and father were going to take dinner with her I was very much interested. When my parents came home I naturally asked what kind of a time they had had. And they said they had a delightful time, and being a child it was inevitable that I should ask, "What did you have to eat?" And they said, "Apple sauce and bread and butter, and gingerbread." Now that was good society in Boston two generations ago, and it would be good society on any spot on the world's surface, and any time in the world's history.

That story has a real significance to Americans because of all ideal civilizations, if we live up to our ideals, we are a democratic people and we are the people who believe in democracy, and democracy is nothing but the incarnation in human societies and human law of those great principles which Jesus taught. We, therefore, beyond all other people, should believe in that kind of genuineness.

We ought to believe that the home should represent the group who live there. It may be a plush and marble group, it may be a calico group, and it is not very important whether the rug in front of the mantel is a Turkish rug or whether it is worn rather thin where the dog and the children congregate. The essential thing is that spirit which is represented there.

### *Strength of the United*

And that ideal has come back to thousands of American women during the war. The simplicity which must come to the home of tomorrow is not only a matter of economic need. It is a readjustment of the point of view of the American woman, and we are finding reflexes of this all over the country. Do not think I am speaking only from theory. In the last year I have been in twenty-seven cities with groups of clubwomen, and I cannot help listening here and there and noting the reflex of this. It is the organized who are thinking that way and organization makes the difference. For ten people who are united have the strength of a hundred who are disunited.

### *The Rural Woman*

Now there is another thing that has come to be evident—the awakening of the rural woman. During the last year a transformation has come over the women of the little towns and farms. They are at last responding to the things that have been said to them, and they are coming into organization with a civic consciousness that they never had before. In my own state we have organized many new clubs, every one studying two things, civics and home economics. In one of the big cities this year there was a danger of home economics work of the University being abolished or put under unfortunate restrictions, and for the first time in the history of that state, from lonely farms, women came to plead with their legislators, this shows the re-awakening now in progress among the women of this land. This is closely related with an understanding of the economic value of their work. It is a curious thing that in style shows, in times past, where some of the women showed what they could do with made-over clothes, the women who gave the estimate never considered the value of their own labor. But now they do, for they now know there is just as much economic value in lonely work done at home, as if being paid eighteen dollars a week for doing it.

### *Valuation of Their Labor*

A year or two ago, as you perhaps know, the Department of Agriculture made a survey of ten thousand rural homes in America and they discovered among many other interesting things, that the average rural woman worked eleven hours a day in winter, and thirteen hours in summer. Yet she is listed in the census as having no occupation. Still just because she is so listed, we mean that she shall not be listed that way in the next census. With the women of the Home Economics Department who took this survey, I went over these figures, and at a very conservative estimate of the value of the labor, if paid for, that labor is worth ten billions of dollars a year. Now it does not have to be paid for and we are not so foolish as to think that the home is primarily a commercial institution. Nevertheless when the women of the country realize the economic value of their work, they are going to have a new sense of their own importance. Now in every way that means definite recompense, but in a way that means humanity. Their husbands are going to have a new sense of the wife's importance, and that is going to mean a demand for training.

### *Opportunity to Serve*

That is the reason we women are asking to push home economics teaching, because we find that where the home demonstrator goes there is not only a trained household, but many other things in life re-adjust themselves. You get the county nurse—the traveling library—the coming together of all elements of the community for a spiritual impetus, and that is what the trained housewife means. She is going to ask you more and more to eliminate the physical side of her life, in order that she may emphasize the spiritual side of her life. That is why I say you have such a splendid opportunity to make your service both spiritual and physical. This readjustment means that we have not so much time for the minor things in life. It is not so important to us whether the inevitable curve is in front or on the sides or behind. We have complicated life and I think we women are chiefly answerable by a multiplication of detail that we mistakenly considered refinement. We must emphasize more and more things that make for up-building of character and those are many of them things of beauty and not only of utility. Some one said that "governments were created for the purpose of life, liberty, and the pursuit of happiness," and we forget the third. What is the use of life and liberty, unless there is some possibility of happiness? I believe that a great deal of the industrial unrest that we have today is the fumbling on the part of people for something that will satisfy life. They think they are going to get it by shorter hours. That may contribute to it—may give the opportunity for it. But unless the individual is given the opportunity tax for spiritual development, there will be no satisfaction. And it is easy enough for you to see where the relation comes in. The specialized home is asking from every industry the help of that industry to minimize the physical labors of the home. It calls for something on your part—it means that you must keep up to your standards. Suppose, as has often happened, I tried buying bakers' bread and I got good bread for a while, and then the baker got to making poorer stuff when he had made his reputation. The housewife is going to ask honor of you in industry—as they are going to give honor to you in the more social relations. They are going to ask from you that trade itself shall exist, not for the sake of trade, but for the sake of society. That is the message of the New Woman to the New Industry.

## *Scientific Nutrition Works for Mankind*

WRITING in the Western Dietitian, Dr. E. V. McCollum discusses in the May issue of this excellent magazine the splendid results which have come with a better understanding of the value of sound nutritional knowledge. The following brief abstracts of his article are quoted to show the rapid advance which is being made in this new field of medicine and chemistry.

"One of the great surprises of the twentieth century, that period in which new wonders have been worked in so many fields of science, is the remarkable progress which has been made in discovering the nutritive needs of the body and the quality of food-stuffs in respect to their capacity to supply these needs. The discoveries in this field stand unique among the contributions to medical science in one respect at least. Nearly all medical discovery of great significance to human welfare has been capable of abuse, and has, through over enthusiasm or lack of skill of individuals, or through application in self medication, been abused and has in individual cases done harm. Scientific nutrition has, on the contrary, worked to the benefit of mankind in every instance where it is intelligently applied."

### *The Disgrace of Rickets*

"A vigorous campaign of education is now going on all over the country in connection with rickets. This disease is a disgrace to civilization, for notwithstanding the fact that probably half the children in America at the present time have had or actually have rickets, it is a very simple matter to prevent its occurrence. Rickets is a condition in which there is a disturbance of calcium and phosphorus metabolism. Children are spared the defective bone growth which it causes, if they are properly fed, and are given regularly as a routine measure suitable doses of cod liver oil. Exposure to sunlight is also very effective in preventing or curing the disease."

### *Faulty Diets Hasten Age*

"Throughout our long experience with the observation of the life histories of animals which have lived under excellent conditions, but whose diets were faulty in one or another respect, we have been much impressed with the fact that when anything is wrong with the diet it shows itself somewhere and in some manner in the life history of the animal. A never failing result is the early appearance of the signs of old age."

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## *Humans are Carnivorous*

At a recent meeting of the Nebraska State Medical Association Dr. W. C. Alvarez, as reported by the Omaha Daily News, said that the craze for rough foods was making much business for the doctors.

"Any animal that the good Lord intended to live on spinach and such things must have an intestinal tract at least twenty-five times the length of the body," said Dr. Alvarez, scoring the vegetable diet. "The human being is a carnivorous animal. If a patient says he is eating plenty of spinach and plenty of bran and all these indigestible things, find out if they agree with him. I have recommended such foods, but not unless I am sure the patient can digest them."

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## *Staff of Life to Filipinos*

Filipinos, prospering under American sovereignty, are becoming bread-eaters. This may be an explanation of their ability to win the far eastern Olympic games. Last year they bought about $8,000,000 worth of flour from the United States.

# The Cooling of Bread

By I. A. Berg

*American Institute of Baking*

## Part I.

THE technical development of the baking industry for the mass production of bread has directed attention to many problems that were formerly considered to be of minor importance. The cooling of bread is no longer a minor problem to the baker whose production has increased to a high level.

The period from ovens to wrapping machines must conform to the production and delivery schedule without loss in time or quality of the product. This requires that the cooling period be as short as possible in relation to the best results.

Efficient baking practice requires adherence to schedule and continuity of operation. If the shop system is not properly organized, loss of time will be a factor of failure which cannot be avoided.

The handling of hot bread for cooling on racks is recognized as a somewhat awkward procedure. It involves considerable handling of the bread, consumes time and utilizes valuable floor space. In moving the loaded racks the loaves are apt to fall to the floor with consequent damage or possible contamination. The racks must be arranged in a definite order for the uniform cooling of each loaf of bread. Since the use of bread racks has these defects there have been introduced conveyors to handle the hot bread from the ovens to the wrapping machines. The increasing number of cooling conveyors which are being installed indicates that bakers are appreciating their value.

### *Bread Cooling Conveyors*

Several bread cooling conveyors are now available and each system has its own special features, but in general they are similar in operation. The bread on leaving the oven is carried by a series of continuous belts to the upper level of a long slow moving conveyor. The bread is then automatically distributed over the surfaces of the conveyor. The conveyor is usually made up of wire trays, carrying pans or aluminum supports with wooden fingers which are fastened to endless conveyor chains. These chains carry the supports downward through several horizontal planes. The movement of the conveyor can be adjusted from one hour to two hours per revolution to allow for cooling under different atmospheric conditions or to take care of emergencies. The cooled bread is discharged by an automatic device on to belts and carried to the wrapping machine. Some of the conveyors are suspended from the ceiling of the shipping room and others are placed on or suspended through the floor or installed in a room used exclusively for cooling the bread.

### *Patented System of Cooling Bread*

A patent on the "Method of Cooling and Treating Bread" has been issued to W. M. Campbell, U. S. Pat. 1,212,900 wherein he provides for a specially designed conveyor which is placed in an enclosed room. The room is air-conditioned by means of an exhaust fan, humidifier and refrigerating coils. The hot bread is conveyed through atmospheres of decreasing degrees of temperatures so that cooling will be gradual and will take place in a predetermined time. The system is claimed to provide for a "range of cooling temperatures and predetermined degree of humidity for the purpose of cooling the bread and preserving a certain degree of moisture while undergoing the cooling process." No definite range of temperatures and degree of humidity are stated in the patent.

There appears to be no definite fixed agreement on what are the proper air conditions of temperature and humidity for bread cooling. Definite information is required which thus far is not to be found in the literature.

It is important that changes which take place in bread during cooling should be controlled for the best results and a fixed time be determined for the cooling process. The latter is of great importance to the production manager who must adjust his schedule at different times of the year so his bread will be ready for prompt delivery.

### *The Temperature of Bread from the Oven*

By thermo couple and maximum and minimum thermometer measurements it has been determined that the interior of a loaf of bread reaches a maximum temperature of about 207° F. only in the last few minutes of baking.

It is difficult to measure the temperature of the crust during baking. However, it seems reasonable to believe that in an oven of 450° F. the crust never reaches this temperature due to the moisture in the loaf.

The writer placed the bulb of a thermometer against the inside of the crust of a loaf taken from the oven and the temperature observed was the same as the temperature of the interior of the loaf. Contact of a specially designed thermo couple against the side of a loaf while baking indicated a maximum temperature of 215° F. for only five minutes.

### *Evaporation During Cooling*

Bread is usually allowed to cool from 1½ to 2 hours or longer in which time from 2 to 4 per cent of its weight in moisture is evaporated. Since bread is generally sold by weight this loss has practical significance. It is also a well-known fact that bread cooled or kept in a manner that prevents evaporation will keep fresh longer than bread which is freely exposed. Ostwald, Katz, and Neumann have shown that staling is due to physico-chemical changes in the loaf and is independent of loss of moisture. However, any method that will prevent the loss of moisture will tend to retard the physico-chemical changes or the cause of staling. The significance of the cooling is therefore important to the baker from the standpoint of economy and keeping quality of the loaf and its reduction should prove of great value.

### *The Theory of Evaporation*

The cooling of bread from an interior temperature of around 207° F. to 95° F., which has been found to be a safe wrapping temperature, is brought about by the surrounding air. The difference between the temperature of the loaf and the temperature of the air will naturally regulate the rate of cooling. Also the condition of the air will regulate the rate of evaporation of moisture from the bread.

Bread like flour is hygroscopic. Carrier[1] has shown that for insoluble hygroscopic materials the vapor pressure of the water in the material is apparently the same as the vapor pressure corresponding to the temperature of the material, whenever the material contains more moisture than it is capable of absorbing hygroscopically. Whenever the moisture in the material is less than the maximum possible hygroscopic moisture content, the vapor pressure of the moisture in the material is less than the vapor pressure corresponding to the temperature of the material. When any material is exposed to an atmosphere having a lower vapor pressure than that of the moisture in the material, hygroscopic moisture will tend to evaporate from the material until an equilibrium in vapor pressure between the moisture in the material and the moisture in the atmosphere is reached. He further observed that the rate of evaporation from a free water surface in both still air and under constant conditions of air velocity is proportional to the difference in vapor pressure between the air and water regardless of the temperature of the air. This practically holds true for hygroscopic materials.

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[1] American Society of Heating and Ventilating Engineers, p. 61, 1922.

The vapor pressure of water or its tendency to become a gas increases with temperature. Following is a table of the vapor pressures of water at different temperatures:

**Table I.—Vapor Pressure of Water***

| Temperature Deg. Fahr. | Vapor Pressure Inches of Mercury | Temperature Deg. Fahr. | Vapor Pressure Inches of Mercury |
|---|---|---|---|
| 32 | 0.1804 | 130 | 4.518 |
| 40 | 0.2477 | 140 | 5.874 |
| 50 | 0.3627 | 150 | 7.56 |
| 60 | 0.5217 | 160 | 9.64 |
| 70 | 0.738 | 170 | 12.19 |
| 80 | 1.029 | 180 | 15.28 |
| 90 | 1.415 | 190 | 20.01 |
| 100 | 1.925 | 200 | 23.46 |
| 110 | 2.588 | 210 | 28.75 |
| 120 | 3.439 | 212 | 29.92 |

The above values expressed graphically indicate the vapor pressure curve.

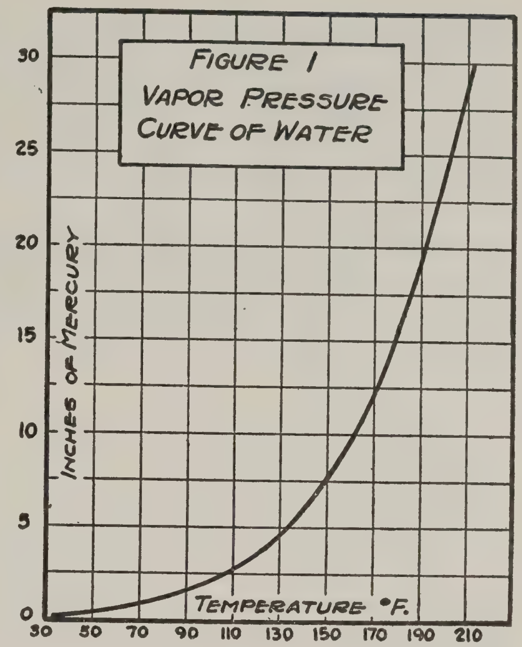
FIGURE 1
VAPOR PRESSURE CURVE OF WATER

The tabulated values for the vapor pressure of water in relation to temperature correspond to the vapor pressure of saturated air or air of 100 per cent relative humidity. According to Carrier's observation that the rate of evaporation is proportional to the difference in vapor pressure between the air and hygroscopic material such as bread it is seen from the curve that when bread is removed from the oven and placed in a room of ordinary temperatures and humidities the rate of evaporation of moisture from the bread should be high due to the large difference in vapor pressure. Thus, bread coming from the oven at approximately 210° F. will have a vapor pressure of 28.75 inches of mercury. If placed in a room of 80° F. of 100 per cent relative humidity with a vapor pressure of 1.029 inches of mercury the difference of vapor pressure between the bread and air of the room will be 28.75 — 1.029 = 27.721 inches of mercury.

From a study of the vapor pressure curve of Figure 1 it is apparent that the more rapidly the bread cools its vapor pressure will correspondingly decrease and also its loss of moisture. As the temperature of the loaf approaches the temperature of the room the rate of evaporation will become increasingly less. If the loaf cools slowly in a room at the ordinary temperatures there will be a greater average difference in vapor pressures than when the loaf cools rapidly at lower temperatures. It is therefore reasonable to expect that if hot bread was placed in rooms of low temperatures with consequent more rapid rate of cooling an appreciable saving would be obtained due to less evaporation.

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* Marks Mechanical Engineer's Handbook.

### *Sanitary Factors During Cooling*

Bacteriological studies show that the crust of bread taken from the oven is practically sterile and that mold infection takes place during the cooling period from spores which settle on the crust. The degree of infection may increase with the time of cooling.

The bread should be cooled in filtered and sterile air, and all the equipment with which the bread comes in contact should also be clean to eliminate the danger of contamination from this source. When it is impossible to maintain such conditions it has been found that rapid cooling will reduce mold infection and retard the development of rope, especially in warm weather. It is shown that bread insufficiently cooled before wrapping retained heat and moisture enough to favor growth of certain organisms, especially when paper waxed on one or both sides was used. It has also been found that bread should not be wrapped having an internal temperature higher than 95° F. These studies call for conditioned air to eliminate infection and to lower the temperature of the bread as fast as possible.

In a few bakeries steps have been taken to condition the atmosphere to which the hot bread is exposed during cooling. The conditioning is produced by humidifiers which saturate outdoor or recirculated air with water vapor. By this means the air is thoroughly washed and the temperature lowered by evaporation. As far as the writer can determine the saturated air usually has a temperature of 70° F. as it enters the enclosed conveyor or cooling room. Obviously, the temperature of the air as it leaves is much higher.

(To be continued)

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## *A Shopkeeper's Vision of Beauty*

By Edward A. Filene

In the final analysis beauty is the greatest objective of the world. But we cannot teach spiritual truths effectively to starving people. One great way to make more beauty in this world is to make the obtaining of a living—the obtaining of the necessary food, clothing and shelter, and the necessary minimum of luxuries—so mechanical and so little time-consuming that we all shall have time for avocations—have time to work for and search for better things—to search for beauty. This can be accomplished by saving of waste, by more economic justice, by invention and better organization of production and distribution, by better training of workers and leaders.

—From The Saturday Evening Post.

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## *Our Posters Please Editors*

"I was much interested in the posters you sent me stressing the use of milk bread in adequate nutrition, and think they were very nicely done. In fact, they were so good looking that I should think the association of milk bread with fruits and other essential foods would remain in the consciousness of the beholder long after. I feel sure that bread will gain more in the long run through this sort of co-operative appeal."

—Alice Blinn,
Research Editor, The Delineator Magazine.

# The Handwriting on the Wall

## *An Address before the American Institute of Chemical Engineers*

By Arthur D. Little

**The daily life of every individual as well as the progress of industry is materially influenced by the results of scientific and industrial research. The baking industry is a notable illustration of the worth of chemists and engineers in the production of better products at lowered costs. No writer speaks with more authority in discussing this subject than Arthur D. Little of the Little Laboratories, Inc.**

THERE is an intimate relationship between science and business. Only the other day I heard a man ask, "Where would the suspender business be without the law of gravitation?" There is also some appreciation of the fact that we are living in a period of change, in which only the resourceful can hope to maintain themselves in the face of the new conditions. Barber shops were once a haven of refuge for masculine humanity, but since they have become bobber shops so conservative a publication as the Police Gazette is reported to be printing two pages of Embroidery Notes.

### *Belshazzar's Feast*

There is a tremendously dramatic element in the Biblical story of Belshazzar's feast. The mighty king was the central figure of a great spectacle, which included his lords to the number of a thousand and his wives and concubines. They were feasting and making merry in the vast hall of the palace, and power and dominion seemed secure. Suddenly, against the wall appeared the fingers of a hand, which wrote upon the wall above the great candlestick the momentous legend in which Daniel read Belshazzar's doom after soothsayers and astrologers had failed to make interpretation. Belshazzar had been weighed in the balance and had been found wanting, and that night the business of governing Babylon passed into other hands.

Doubtless Belshazzar deserved what he got, but even at this late day I am moved to say a good word for him. He had called in Daniel as an expert, and despite the unwelcome character of his report, had paid his bill upon the spot. How many of you, after prophesying that a business was headed for a receivership, have been rewarded with a scarlet cloak and a gold chain about your neck and a directorship in the company, all without discount for cash? Belshazzar may have been a poor king, but he was an ideal client.

Belshazzar, as some of you may know, is dead. He has been dead a long time, some 2,500 years. I would have directed your attention to some one who, like Charles the First or Louis the Sixteenth, has died more recently were it not for the fact that they, unlike Belshazzar, failed to see the handwiriting on the wall. Their end was, nevertheless, the same.

### *The Balance Sheet*

There is a strange periodicity in the recurrence of this handwriting and still more curious inability to perceive it on the part of those who sit down to feasts. It is on the walls where Rotary Clubs lunch, where manufacturers' conventions dine, where chambers of commerce meet, and where trade associations gather. It outshines at Atlantic City the illuminated signs that compel attention to cigarettes and chewing gum, but for the interpretation of it there are no scarlet cloaks and golden chains. Traveling expenses and oblivion are the utmost Daniel could hope for today, and tonight I can look forward only to oblivion. Even at that price I am willing to interpret the handwriting which confronts our industry. It reads: The price of progress is research, which alone assures the security of dividends.

I had, not long ago, to look over the balance sheet of a company which had paid no dividends for several years. I was at some loss to account for its poor showing until I read among its assets the item, Laboratory Equipment, $49.51. I hold a little of its stock. How much am I offered? In such a laboratory one would expect to find the embryonic chemist who reported that hydrofluoric acid "itches" glass, or that other one who requisitioned "methyl orange juice and a brunette, with meniscus."

### *Sales or Research*

I once suggested to the purchasing agent of a great corporation, who bought many million dollars' worth of material a year, that large savings could be effected by chemical control of his supplies. He closed the interview by saying: "I believe in chemistry all right, but I have a son who is a sophomore at Yale. He comes home every other Sunday and I get all of it I need from him." That company is now in the receiver's hands. The result would probably have been the same if the son had gone to Harvard.

One hears that the textile industry of New England is in a bad way, but one is also told that "its only problem is that of sales." Sales are likely to remain a problem until mill agents realize that research creates markets. Just now it is about as easy to interest the agent of a cotton mill in research as it is to sell trunk straps to an elephant. Meanwhile, the Europeans, who have learned to trust research, have developed artificial silk and find no difficulty in selling wood pulp at $2 a pound in a market in which old-line mill agents can't sell cotton.

### *Headed for Perdition*

The future of the shoe industry in New England has long been a matter of much local concern, but it would be hard indeed to find a New England shoe factory that could list, among its assets, even $49.51 worth of laboratory equipment.

But this failure to read the handwriting on the wall is by no means peculiar to New England. It is still, with a few conspicuous exceptions, characteristic of American industry as a whole. Not long ago Dr. Teeple pointed out that of 44 American companies which, during the war, engaged in the production of potash, only one has survived, and it was that one alone which developed and supported a program for research.

If there is an industry that needs research it is that of naval stores; yet the president of one of its largest companies has said within a few months, "There are no scientific problems in our business." The country which has no history may be blessed, but certainly the industry which has no scientific problems is headed for perdition.

### *Research in Petroleum*

There are scientific problems without number in the petroleum industry, but does the industry spend one-tenth of a cent a barrel to bring out the enormous potential values in its failing resource? It does not. Its chemists, with few exceptions, merely measure physical constants or spend their effort on the solution of miscellaneous routine problems.

Science is now advancing at a rate so rapid and with results of such far-reaching influence that no industry can hope to ignore research and live. Summer follows winter with such unfailing regularity that the ice business would seem to be reasonably secure. But the iceman has now to reckon with the probability that a million electric refrigerators will be installed within the next two years.

### *Your Victrola*

The Victor Talking Machine Co. had a business so highly profitable and so well organized that dividends on its common stock averaged more than $42 a share for eleven years, to which, in 1922, was added a 600 per cent stock dividend. Meanwhile, research has developed radio, and the Victor company has passed its dividend. That is the sort of handwriting that any manager should be able to read; yet only the other day the president of a corporation making metal products of a highly specialized sort wrote, "We are not interested in any technical development work."

In a situation so clear to us as chemists and chemical engineers and so charged with peril to American industry it is our imperative duty to translate the handwriting on the wall to those who mistake it for mural decoration.

### *Research or Tariff*

American manufacturers must be made to understand that we are in the midst of an industrial revolution, in the course of which many established businesses will find their balance sheets deeply dyed with red unless those charged with the responsibility of management can learn to direct their course in the flood of new knowledge pouring from the laboratories. To those with vision science is bringing countless new opportunities for constructive and profitable effort, while it is likely to take whatever they may have from those who will not see.

Everyone is familiar with the recent terrific impact upon our wood-distillation industry of a new German synthetic process for the production of methanol. There has been the usual reaction—a rush to Washington to have the tariff raised when the only protection against research is more research.

Acetic acid, another basic product of this industry, is now being made from coke and lime through calcium carbide and acetylene, but it was not so made by raising the tariff.

### *Inheritance of Mystery*

The foundations of the solvent industry are similarly shifting. It is but a little while since butanol made by a relatively cheap fermentation process from corn has replaced the expensive amyl alcohols, but already work in our own laboratory has convinced us that amyl alcohols and many others can be made far more cheaply from petroleum.

The paint and varnish industries find themselves suddenly called upon to reckon with altogether new types of finishes, the products of research in nitrocellulose and solvents.

There has been for years a comfortable opinion among those engaged in the business of making paper that an understanding of its mysterious operations was inherited, like red hair. A chemist could always tell a born paper-maker but he couldn't tell him much. Even our resourceful friend, Moore, had to break into the mill by way of the woodyard, but now the mill is raising peanuts to make oil to convert into something with a much prettier name than lard, by combining the oil with hydrogen, which is a waste product of the plant he built to bleach woodpulp. Isn't it ridiculous—but very profitable?

### *Accomplished the Impossible*

It is about time for the born papermaker to cultivate a sense of the ridiculous, for a lot more foolishness is coming. It used to be foolish to talk of making paper from southern pine but somehow a chemist did it and southern mills are making not only paper but money. The oldline superintendent who doesn't need any damned chemist to come down from Boston to teach him the paper business will soon be competing as best he can with new methods of making newsprint from hitherto unused woods and with new processes for wood pulp giving hitherto unheard of yields.

The fuel industries are in an extraordinary state of flux and many revolutionary developments are impending. The use of powdered coal is rapidly extending. Low-temperature carbonization is steadily making headway. We are coming slowly but certainly to an artificial anthracite and we may confidently look to coal for a proportion of our motor spirit. Cheap oxygen is almost here and when it comes there will be profound changes in combustion methods and in metallurgical practice and these will require new refractories.

### *The Gas Industry*

The gas industry is facing a great development, much of which will be along new lines. New methods are available for water gas enrichment. There are serious proposals for the complete gasification of coal and for great gas works at the mines with high pressure distribution. The industrial use of gas has just begun and house heating by gas is near at hand. Having learned to cook by gas we are now about to install the gas-fired refrigerator.

If we consider power generation we find the mercury turbine operating at extraordinary efficiency in a nearby city.

### *Manufacturer and Investor*

Industrial developments along new lines are everywhere in progress and they call upon the chemical engineer for new equipment and new methods of production and control. Contact processes, operating at high pressures, present many new and serious problems which we have as yet hardly considered in this country. The pyrolysis of petroleum and of other organic materials calls for equipment of new design and for fractionating apparatus of the highest order of efficiency. Whether tetraethyl lead is here to stay or not, it has been with us long enough to indicate that the whole aspect of a major industry may be changed almost overnight by the advent of a new product from the laboratory.

Though I have read tonight no more than the first word of the handwriting on the wall, it must be clear to all of you that in the industrial revolution which it portends the chemical engineer will be on the firing line. He will be called upon to attack and conquer new problems at every step of the rocky road from the laboratory to the plant. The Chemical Institute has devoted much consideration to the education required to fit the chemical engineer to meet his new responsibilities. Let us now endeavor to educate the manufacturer to realize the opportunities before him, and let us teach the investor to appreciate the perils which confront those companies which ignore research.

# The Ham Sandwich

## *When Eaten With Its Usual Accompaniment, A Glass of Milk, It Becomes A Very Satisfactory Food*

By Roscoe H. Shaw,
*Chief, Department of Nutrition, American Institute of Baking*

NO ONE knows who invented the sandwich; it is probably as old as the art of bread making itself. The priests of the ancients dined upon sandwiches made of sacred wafers and honey. It graced the banquets of the Greeks and the ancient Romans. Since it was a natural invention combining two important articles of food, it had the qualities which endured.

The name, however, is of comparatively recent origin. During the latter part of the 18th century there lived a certain John Montague, the Fourth Earl of Sandwich. He was quite prominent in the British political life of that period and at one time was First Lord of the Admiralty. Although gifted with a brilliant mind, he was greatly addicted to the dissipations of life and an inveterate gambler. As the story goes, his card games were often of 24-hour duration and so bitterly fought that the time for eating was begrudged until Lord Sandwich hit upon the plan of having his servants bring in the meals in the form of meat between layers of bread. Food served in this way could be eaten without interfering with the game. This form of food immediately became popular and the term sandwich, named for Lord Sandwich, clung. It is also said that mustard with sandwiches came into use at this time.

The name sandwich naturally brings to mind the Sandwich Islands: perhaps some have the idea that there is a connection between these islands and the popular article of food about which this article is being written. There is a connection, though not a direct one. Among the cronies of Lord Sandwich who sat in with him on many a good game, was Captain James Cook the famous English explorer. About this Captain Cook many an interesting story could be told, but our particular interest in him lies in the fact that he discovered certain islands in the Pacific Ocean which he named the Sandwich Islands in honor of his friend. Many years afterwards we adopted the Sandwich Islands—they are now called the Hawaiian Islands. We likewise adopted the sandwich, though not by the same geographical route.

Sandwiches today are popular as never before. It has been estimated that in this country alone 30 million are consumed in a single day. Perhaps a better idea of what this enormous number means will be gained from the fact that if these sandwiches could be laid side by side they would stretch out nearly 2,000 miles or a distance equivalent to that between New York and Salt Lake City.

So popular has the sandwich become that special sandwich bread is being made and special machines for slicing this bread and the meats used with it are on the market. Toasted sandwiches are of more recent origin and have met the instant approval of the public. Machines have been perfected which toast such sandwiches in their entirety. These machines are frequently seen in drug stores where they never fail to arouse interest.

The sandwich has escaped from the

home into the restaurant, and from the restaurant into the drug store. Within the last year or so, in the larger cities chains of sandwich shops have sprung into existence. As a rule these shops present an inviting appearance with more or less coloring in their furnishings. While other foods are served in these shops, the sandwich is featured. Although these sandwich shops are usually small, during the lunch hour they are crowded to capacity; the number of people they serve within the limited lunch hour is amazing. The sandwich has also invaded the catering business. During a recent convention in Chicago one of the large catering establishments made 50,000 sandwiches in a period of four days.

To enumerate the variety of sandwiches would require a paper by itself. They exist all the way from the simple wafer-like bread-and-butter sandwich of the afternoon tea to the huge club sandwich which is a hearty meal in itself. Sandwiches have become such an important article of food that they have invaded every class of society and everywhere at some time or another they form a part of the the average American's diet.

Bread forms the basis of all sandwiches. While bread made with milk is nearly a balanced food, the average bread requires some bolstering before it will fulfill our food needs. The addition of meat, egg, or cheese supplies supplementary proteins, mineral salts, and vitamins. Even with the simplest of the sandwiches, the plain bread and butter variety, the butter supplies a vitamin, to say nothing of the additional fat.

There is much being said and written nowadays about child feeding. It is recognized that children require more food than had previously been thought necessary. They especially need the sources of quick energy. In this connection the plain jam sandwich should not be overlooked. Such a sandwich is almost always acceptable to the small child and in addition to the carbohydrates of the bread, the sugar in the jam yields many calories of energy. The peanut butter sandwich is also a favorite with children.

The addition of tomato, lettuce, and cucumber not only supplies succulence and acceptability to the ordinary sandwich but also makes it more nearly balanced by adding vitamins and mineral matter. These same additions also supply the roughage which many people seem to require. A form of sandwich which is quite popular in restaurants is the so-called hot sandwich. This consists of a slice of bread, sometimes toasted, with a generous portion of hot meat (frequently a small beef steak or a chop). The whole is covered with hot gravy and is a fair-sized meal in itself.

Another use for sandwiches which probably antedates their sale in the restaurant or drug store, is at the picnic. No doubt, here the pure air and the pleasant surroundings add much to their palatability. The mother in the home whose patience is frequently taxed in persuading the small boy or girl to eat nourishing food, will find that the little boy will gladly eat bread if presented to him in the form of a sandwich made with preserved fruit, and the little girl will gladly accept one made with perhaps some form of minced meat and mayonnaise dressing.

While Lord Sandwich's principal motive for using the sandwich was as a time saver to facilitate his gambling proclivities, in modern times it is serving the purpose as a time saver to thousands and thousands of office workers in this country. The sandwich forms the piece de resistance of the average city worker's lunch. Writers on health have frequently called attention to the undesirability of hasty eating. Undoubtedly the average man, or woman for that matter, consumes his noonday sandwich too quickly. If, however, the purpose of this haste is to gain more time for a walk in the open air before returning to the indoors, perhaps no gross mistake has been committed.

Since the sandwich has become such an important article of food in this country, the Department of Nutrition of the American Institute of Baking has for some time been conducting feeding tests with sandwiches. The ham sandwich is undoubtedly one of the most popular and it is on this variety of sandwich that most of the work was done. By purchasing ham sandwiches at various places in the neighborhood of the Institute, it was found that the percentages of ham in the sandwiches vary within very wide limits. The sandwich with the wafer-thin slice of ham contains only about 15 per cent while those with particularly generous slices of ham may contain 60 per cent. As a sort of arbitrary standard, sandwiches containing 20 and 30 per cent of ham were chosen.

For obvious reasons albino rats can not be fed on the sandwich as such. Ham sandwiches were prepared of desiccated ham and desiccated bread, the proportions being based on the original moisture content of both bread and ham. The bread was the ordinary milk bread, F.I.D. 188, that is, bread in which one-third of the liquid ingredient used was milk or its equivalent in milk solids. The bread was made in the bakeshop of the Institute. After standing on racks all night it was sliced and allowed to become air dry; it was then ground in a power mill to a coarse meal. The ham was prepared for us by Wilson and Company of Chicago, and dried at a low temperature. An intimate mixture of ham and bread in proportions of 20 and 30 per cent was fed to 12 young albino rats. The feeding test was conducted in the usual way, the animals being confined in individual cages and beside their diet of ham and bread, receiving nothing but plenty of clean drinking water. They were kept under observation and weighed at frequent intervals.

It was found that neither proportion of ham and bread alone or with any of the usual materials used in making the ham sandwich, would produce normal growth. They grew well for a while but their growth curve never paralleled that of normal growth. We may therefore assume that no proportion of ham and bread, either with or without butter or lettuce, constitutes a balanced food in so far as the growth of young animals is concerned.

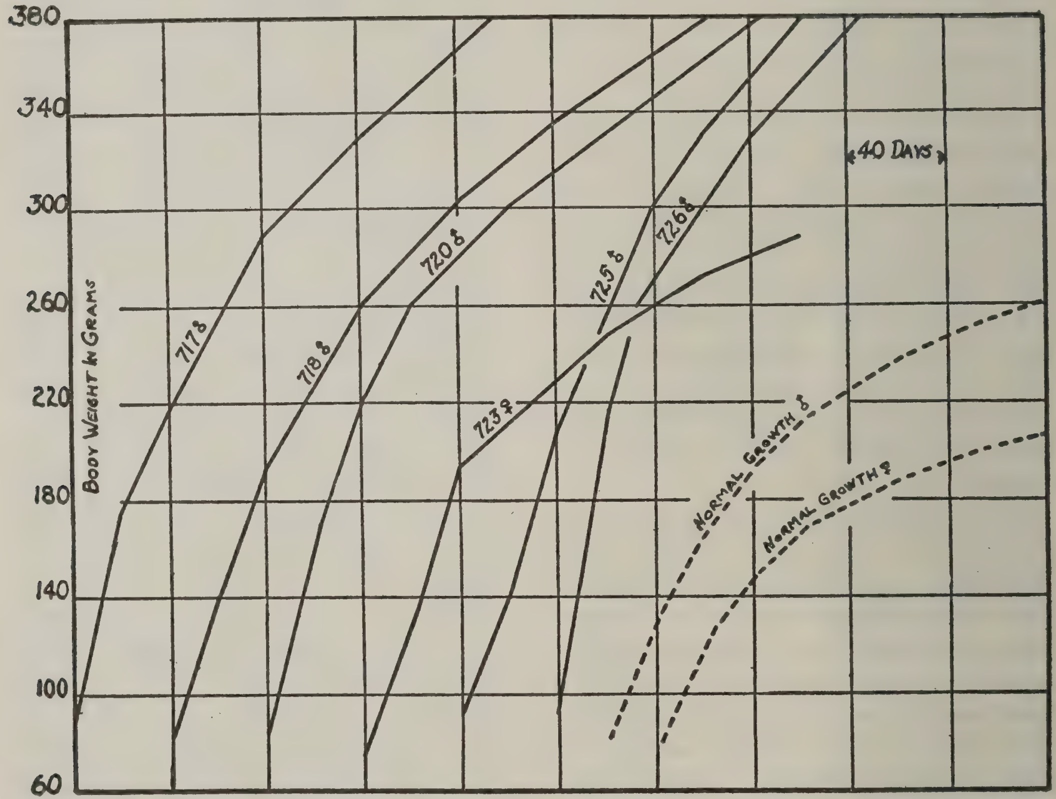
Since a glass of milk is the usual accompaniment of the ham sandwich a feeding test was then conducted using the 20 and 30 per cent ham sandwich of average size with the equivalent of a one-half pint glass of milk. As in the previous work desiccated ham and bread was used and in addition a quantity of powdered whole milk equivalent to a one-half pint glass of whole milk to one average sized sandwich.

With this combination the albino rats thrived. They grew in a normal manner —in fact they grew faster than the average rat on a complete food. Their fur was smooth and they had at all times the appearance of healthy rats. Their growth curves are shown in the accompanying chart. The ham sandwich with a glass of milk combines the proteins of the bread, the ham, and the milk, furnishing the required variety. The carbohydrates are supplied by the bread and the milk sugar, the fats are those of the milk, the bread, and the ham. Vitamins are present in all three of the constituents. While the calorific value depends largely upon the size of the sandwich and its proportion of ham, an average sandwich should furnish between 400 and 500 calories.

### *Ham Sandwich a Complete Food*

We may therefore conclude that the combination of the ordinary ham sandwich consisting of bread, ham, and a glass of milk is a complete food in so far as growth is concerned and the office worker or others may indulge in this form of lunch with the feeling that they are eating a satisfactory meal as far as its balance is concerned and one that should furnish from one-sixth to one-fifth of the calories required for the day.

We wish to acknowledge the generous co-operation of the Institute of American Meat Packers through Wilson and Company in furnishing and preparing the ham used in the feeding tests and of the Merrell Soule Company in furnishing the powdered milk.



**Growth Curves of Albino Rats Fed Solely on Ham Sandwiches and Milk. Nos. 717, 718 and 720 were Fed the Equivalent of One Glass of Milk to One 20% Ham Sandwich. Nos. 723-725 and 726 Same with 30% Ham Sandwich.**

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## *Balanced Diets from Bakeries*

Bread is not the staff of life that it used to be. Apartment house kitchenettes, delicatessen stores, and the substitution of other grains for wheat during the war have decreased the per capita consumption. Bread, "like mother used to make" is relegated to history. The modern mother orders hers from the grocery or the bakery, and sees to it that her family gets a balanced diet with plenty of vitamins and calories and all the other things that our grandmothers never heard of.

—San Jose Mercury Herald.

## The Logic of Bread Eating

PEOPLE of the United States do not eat enough bread. A scientific authority of Cornell Medical college attributes the small quantity of bread consumed here to the fact that high wages are paid and that people are inclined to purchase the more expensive foods.

Not until the big world conflict was well launched did the present generation realize the significance of bread and the vast part it plays in the well-being of the individual.

A shortage of transportation facilities and chaotic trade conditions generally during the war resulted in distressing food conditions that brought home to the individual a keener realization of the great value of bread.

### *French Realize Value*

One writer in contemplating its tremendous economic importance exclaimed, ''Today nations are made or wrecked because of their wheat supply, or lack of it.''

The lack of sufficient bread is a big factor in the conditions of unrest which exist in many parts of the earth today. The significance that is attached to an abundant bread supply is illustrated by the fact that in order to avoid the dangers of bread riots, several European nations subsidized the wheaten loaf and charged the loss up to the cost of the war.

The French have always been big bread eaters. They get 60 per cent of their diet in the form of bread. The people of Spain and Italy are also hearty consumers of bread. Under the stress of war, the Italians derived 90 per cent of their nourishment from bread.

### *It Builds Strength*

Great Britain also greatly increased her consumption of bread during wartimes. A very restricted meat supply meant that the British simply had to eat more bread. In England bread-eating increased from 35 to 50 per cent of the diet. The continuance of this large consumption since the close of the war is pretty good evidence that the English prefer this simpler diet to the more expensive diet of pre-war days.

Food experts now recognize bread as the master builder of physical strength. Bread is the best fuel food and the least exhaustive. It is also excellent repair food and the diet which includes a generous proportion of bread will renew the body tissues as they become worn through activity of many kinds.

—Kansas City Traveller.

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## It Is Good Bread But—

SEVEN loaves of every ten that come to the American table now are baked in commercial bakeries, and baking day—when Mother made those great big wonderful loaves of bread—is passing from American life. Remember bounding into the house after school on baking day and throwing the books on a chair, while Mother cut off a thick slice of bread ''right out of the oven'' and covered it with jam? Remember, too, the spot of flour on Mother's nose or cheek that you kissed away in appreciation of that after school slice of bread?

In looking back on those days one remembers now that Mother was tired out after a day of baking bread for the week, but she wouldn't acknowledge it because it was real joy to her to know that Dad and the kiddies liked the home-baked bread so much.

Baker's bread is good but lives there a man with memory not dead, who never to himself hath said, ''The best and only was Mother's bread?''

—Santa Cruz Sentinel.

# Challenge of the Normal Child

By KATHERINE GLOVER*

THE first American Health Congress ever held in this country gathered in Atlantic City the middle of May. It was an evidence of the spontaneous moving together of the men and women in the vanguard of the movement to protect and prolong life — scientists, practitioners, technicians, public health workers and nurses. Six thousand assembled for the meeting and sixteen organizations pooled their interests and experience in the joint sessions.

The Congress bore witness to the fact of a rapidly increasing cohesion in the various efforts to prevent disease and handicaps and to promote the capacity for life and health. Scattered streams of endeavor are flowing into central channels of co-operation, purposes are unifying, and standards and clear-cut measurements evolving.

### *The Keynote Was Prevention*

Prevention was the keynote of the aims of the sixteen organizations, and it sounded through every session as a hopeful welkin.

The focussing point of the Congress was unquestionably the child. The last word of medical science, the rich findings of the chemical, the biological and the social laboratory, the accumulated wisdom of nurses and health officers, all were laid at the feet of children, with the hope that prevention might begin at this logical point which would really prevent, protection which stretches out into the future, and habits of right living built into early mental and physical fibers to foster an enduring attitude of healthful living.

Perhaps the most significant note of the Congress was the challenge which Mr. Hoover, as spokesman and president of the American Child Health Association, threw out to the group of experts gathered from all parts of the country, to produce the normal child. He declared the hour has struck for us to envisage normality and to make it possible to answer in accurate terms the eager question of many parents, "Is my child normal?"

### *The Standard Is Illusory*

"It seems somewhat of an anomaly, an arraignment of all our scientific endeavor, our beneficent intentions, that this standard of normal child is as yet an illusion, a fantasy into which it is necessary that we blow the breath of life, you with your scientific knowledge, your broad experience—I, as the layman, demanding that the normal child become a possibility.

"If we only knew, it would give a new orientation to all these endeavors. It would transform our thinking from deficiencies to positive terms of an ideal—I do not say the perfect child, because I do not wish to ask the impractical—but there must be some basis upon which parents, teachers and health authorities can check up the individual child—and see that it keeps normal.

"We surely have enough knowledge, if brought together, compared and sorted, to give us some standard of the normal child, or at least lead the way to him. The crux of the problem is, as quickly as possible to bring what knowledge we have into the open and to make it familiar to the average, busy, but deeply concerned parent."

Mr. Hoover has spoken before in terms of material economics and the country has listened and acted. In demanding before this great health Congress the normal child, he spoke in terms of human economics and his words ushered in a new era in the social movement to give the child his rights. The movement which hitherto has largely been concerned with handicaps and correction, now steps out upon the high peak of positive health and declares its goal as normality.

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* A report made to American Child Health Association.

Throughout most of the sessions ran this hopeful note of seeking after standards of healthy living, healthy environment, healthy development.

### *A Democracy of Protection*

Dr. Arnold Gesell, speaking of the growth of the normal pre-school child, put the question, "Is not the concept of complete growth becoming the guiding ideal in all child hygiene?" He declared that the new interest in the pre-school child is a social movement comparable to the democratization of elementary education and that having made unsurpassed large-scale achievement in public education, we in America must now try to equalize the earlier developmental opportunities of childhood. "This can only be done by replacing the historic concept of education with the modern biological concepts of growth and development—initiating a policy of developmental supervision with the birth of the infant and projecting that supervision medically and educationally throughout the entire period of pre-school childhood." Such prophecy of a democracy of protection for all children opens up large vistas of hope.

Light as a new ally of growing children, a preventive for rickets which is one of the most insidious and widespread enemies to normal growth, and discussions of the power that lies in sunlight was one of the most significant scientific points thrown upon the screen. One whole session was given to the subject of Light and Life.

### *Mental and Physical Health*

It was evident through the programs of the Congress that the mind of the child has swung into the orbit of study and interest equal almost with his body with a growing recognition that mental health is closely allied with physical health and inter-dependent. Such arrangements are being worked out from the study of large numbers of children that standards of mental growth are clearly emerging.

The Health Congress gave abundant testimony of the turning of the tide in the movement concerned with child welfare, which began to take shape fifty years or so ago. When leaders of scientific thought begin to focus their interest upon the normal child and earnestly seek the measurements of health and normality in terms of the complete child; when, in a word, they shift the emphasis of their effort from cure to prevention, from the negative to the positive, we have reached a definite boundary of progress. The results of such an onward swing of thought and effort will reach far into the future and are not to be clearly evaluated now.

### *Impressions of the Congress*

Three final impressions stand out when the deliberations of the Congress are sifted: That the normal child, lined against a strong background of hope, will begin to assume clear-cut outlines within the next few years; that already the forces, scientific and social, are moving to answer the challenge; and the third the great need to make quickly and widely available to all children the new aids which science and education have proved in certain favored areas.

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He who has bacon and bread soon finds a companion.

—Old Danish Proverb.

# Milling and Baking Technology

## *Abstracts of Papers Read Before the American Association of Cereal Chemists*

The annual meeting of the Association of Cereal Chemists brings together the leading workers in the field of milling and baking. Many subjects of fundamental importance were discussed at the recent Denver meeting. By arrangement with the editors of Cereal Chemistry, the official publication of the Association, we print herewith abstracts of some of the important papers. Other abstracts will appear in later issues of Baking Technology.

### Plasticity—Its Possibilities in Cereal Research.

By J. A. Dunn, Pillsbury Flour Mills Co., Minneapolis, Minn.

There are three classes or types of flow, when matter is subjected to sheering stresses which exceed the elastic limit of the material in question. In viscous or linear flow, the amount of deformation is proportional to the deforming force, and the ratio of deforming force deformation is a measure of viscosity. As the force is gradually increased, a point is reached where the ratio suddenly falls off. At this point, the flow becomes turbulent or hydraulic. There are substances, however, which require a certain minimum amount of force before flow starts at all. These substances are plastic, and such flow is called plastic flow.

Many familiar substances which are usually considered to be solids, are in reality very viscous liquids. Thus pitch, sealing wax and glass are viscous liquids, whereas paint, clay-slip and flour dough are plastic solids.

If a substance is truly viscous, various methods of viscosity determination will lead to the same value. This is not the case if we run such determinations on plastic material. There is little doubt but that flour doughs, or even flour-in-water suspensions exceeding 10% flour content, are plastic solids and have definite plastic characteristics. Therefore plasticity investigation of flour doughs seems simply justified.

The determination is fairly simple. A flour-in-water suspension is made up according to a standardized procedure. It is placed in a Bingham & Murray plastometer and pressure is applied, which forces the dough through a long capillary. The time necessary for the dough to reach various points in the capillary is read with a stop-watch. The temperature is held constant by means of a water thermostat. The pressure applied is read on a manometer. The pressure applied, and the time necessary to reach a series of points along the capillary are the only readings taken. All the other factors may be calculated. The rate of flow is then plotted graphically with the force at each point in the capillary. The curve thus obtained is a straight line intercepting the force axis. The intercept gives a measure of the yield value, which is constant for each flour.

At the present time, there is too little evidence to enable anyone to make a statement as to whether or not there is a correlation between plastic figures and baking strength.

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### The Problem of Test Bakes, with a Discussion of Certain of Their Chemical and Physical Aspects.

By Frederick L. Dunlap, Industrial Appliance Co., Chicago, Ill.

Test bakes in the laboratory are the only means now available of judging properly the quality of a flour. Flour freshly milled does not give as good baking results, however handled by the baker, as the same flour which has had its hydrogen ion concentration increased. As the result of many experimental bakes, it has been proved that acidified doughs, that is, doughs made from flour whose hydrogen ion concentration has been increased with Beta Chlora, give much finer baking results than the same flours before such treatment, however handled in the fermentation. Beta Chlora shortens the fermentation period, because it increases the initial hydrogen ion concentration. With flours so treated, if a short fermentation period precedes a longer one—just the reverse of common practice—the baking values are materially enhanced. It is also shown that to determine the baking or bread value of a flour, it must be handled in accordance with its nature. If this is not done, no accurate measure of flour quality is possible.

It is a well recognized fact that a dough, to bake properly, must have its gluten conditioned or ripened during the fermentation period. No well defined views on this conditioning of gluten have been advanced. This paper puts forward the thesis that conditioning of a dough is a function of the hydrogen ion concentration. The hydrogen ions in dough may be produced by treatment of a flour with Beta Chlora or the deliberate adding of acids, or by fermentation, or all combined. The first two, with the consequent shortening of the fermentation period, produce the best results. The effect of these hydrogen ions, or intensity of acidity, is to change the nature or quality of a large proportion of the gluten by dispersing it; that is, its physical character is changed or a residue of undispersed gluten remains which, because of its smaller quantity, is more elastic and better fitted to expand and hold the gas bubbles of carbon dioxide produced during fermentation. If too much or too little gluten is thus dispersed, optimum baking results are not obtained. The dispersed gluten may be in a gel form and such colloidal gels are frequently elastic. Perhaps this may be a factor, or even the dispersed acting in conjunction with the undispersed. At all events, the phenomenon of the dispersion of gluten is the important thing necessary for conditioning a dough and the dispension must be carried on to the proper degrees to get optimum baking results. Beta Chlora is an efficient aid in helping the dispersion along and to get, therefore, optimum bread values from a flour.

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**Leavening Agents for Self-Rising Flour.** Irene T. Ranker and Paul Logue, Provident Chemical Works, St. Louis, Missouri.

To meet the growing need of an accurate criterion for judging the quality of self-rising flour, a score card for biscuits is proposed which considers the relative values of the taste, texture, color, lightness and volume. A standard is baked with each test using a high grade 40% patent soft wheat flour properly leavened, to which the biscuits to be tested are referred for a comparison of each characteristic. In this way a total score is obtained which is comparable from day to day and may be used to reflect in a single figure the relative quality of different self-rising flours even though baked at different times.

By the use of this method it was found that different flours to produce the best results require different proportions of leavening agents. While the neutralizing value of the acid leavenng agents can be easily determined by titration this cannot be relied upon to indicate in every case the most desirable proportion to use because of the variation in the quality of the flours themselves, particularly the acid value. It was found that in every case the highest biscuit quality from each flour was obtained when the hydrogen ion concentration of the finished product was in the range pH 7.0-7.3. It is necessary, therefore, in order to secure the optimum result, to regulate the proportions of the leavening agents to secure this pH value in the baked product.

With most soft wheat flours the gas evolved from 1.5% sodium bicarbonate is all that the strength of the flour will permit, but in the case of hard wheat flours, as might be expected, a larger proportion may be used—1.75-2.00%.

Even differences in the quality of mono calcium phosphates can be detected when baked under these standard conditions, particularly as they affect the color of the biscuit.

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**Variation in Diastatic Activity of Flour.** By C. E. Mangels, North Dakota Agricultural Experiment Station.

Straight grade flours were prepared from selected samples of wheat of known history on small experimental mill. Diastatic activity was determined by the Rumsey method.

Variation due to variety—Selected samples of different varieties of wheat grown at Fargo and Dickinson were used. The Kubanka, durum variety shows decidedly higher diastatic activity than any of the hard red spring varieties. Kota wheat flour was significantly higher in diastatic activity than any other hard spring varieties. Similar results with varieties were obtained with 1923 and 1925 crops.

Variation due to rainfall—Samples from 1923 crop indicated that low diastatic activity accompanied low rainfall. Flour prepared from Marquis wheat produced at different points in the state show some variation in diastatic activity and a small positive correlation between diastatic activity and rainfall was found.

Variation due to soil treatment—Flour prepared from wheat produced on fertility plots at Fargo showed considerable variation in diastatic activity. The soil fertility appears to be of greater importance as a factor than climatic variation.

The number of samples handled in this study was not sufficient to permit definite conclusions, but data indicates three sources of variation in diastatic activity: (1) variety (2) rainfall (3) soil fertility. The diastatic activity of most varieties of hard red spring wheat flour examined was relatively low, and indicates that lack of diastatic activity may often be the cause of poor baking strength in hard red spring wheat flours.

# Books for the Baking Laboratory

PROTEINS. Lectures given in the United States of America in 1924. By S. P. L. Sorensen, Director of the Chemical Department, Carlsberg Laboratory, Copenhagen. The Fleischmann Laboratories for the Investigation of Fermentation and Industrial Research, N. Y., 1925 XX + 142 pp.

The publication of Prof. Sorensen's American lectures by the Fleischmann Laboratories of New York, is commendable, as it presents in permanent form important contributions from the laboratory of a skilled investigator in pure scientific research who has a profound appreciation of the social value of co-operation between pure science and industry, from personal experience.

The collection of lectures is also a tribute to this distinguished chemist and a memorial of his visit to the United States in the fall of 1924, when he was elected an honorary member of the American Chemical Society.

There are but few men in a generation who have the privilege of realizing that the results of their contributions to a restricted and special field of pure science, have been utilized in their lifetime not only for the improvement of control in important industries, but for the study of problems in medicine that point the way toward advance in the treatment and alleviation of disease.

It is usual in the history of science to wait a generation or more before their work fructifies and becomes vital to further industrial or social progress. Prof. Sorensen's work, however, has not had to wait until discovered by a future generation, since it already has become essential to the control of many of the fermentation industries, the preparation of biological material, and the problems of therapy.

The scientific lectures published in the "Proteins," discuss the solubility of proteins, their osmotic pressure, their coagulation by heat, and the characterization of proteins, followed by two popular lectures, one on bread-making, hydrogen ion concentration and proteins, which was delivered before the 27th Annual Convention of the American Bakers Association at Atlantic City, and the other, an address on Louis Pasteur which was given at the American Institute of Baking at the unveiling of the bronze bust of Pasteur presented by Helge and Vagn Jacobsen and the Carlsberg Foundation in September, 1924.

Prof. Sorensen's main point of view in relation to his protein researches will be found in the introduction. It is fundamentally that of the classical chemistry, although the value of some of the recent work which has been termed "colloid chemistry" for want of a more exact expression is recognized in clearing up some of the phenomena which does not lend itself to explanation in terms of pure chemical theory.

As Prof. Sorensen puts it, "colloid chemistry applies particularly to behavior which is dependent on the physical and not on the chemical nature of the substance in question. However, when properties and reactions in which the chemical nature of a substance takes part are being considered, the colloid chemical point of view is generally ineffective for giving any satisfactory explanation. As we are here concerned with a number of the most important and in the most exact sense, characteristic properties of the protein, it may be said in this connection, that colloid chemistry, frequently one sided, has often restricted rather than advanced the study of these proteins. This is largely due to the conception that protein solutions, being of a colloidal nature are so different from ordinary true solutions in their behavior that it is impossible to apply the theories based on the study of true solutions to protein solutions."

Prof. Sorensen's contributions have indicated what can be done in treating proteins by a skillful technique of investigation, in spite of the time required and the laboriousness of continued concentration on details in order to overcome the inherent obstacles of satisfactory characterization.

This book will be eagerly sought by all those interested in the protein field, and we hope that a second edition may be published for the benefit of students and others who may not have access to the present limited edition.

—C. B. M.

## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Method for a graphic record of texture, volume and contour of cakes.** Alice M. Child and Daisy I. Purdy. Cereal Chemistry 3, 57-60 (1926).—Mix together thoroughly equal parts of mimeograph ink, glycerol and $H_2O$. Cut a piece of blotting paper slightly larger than the piece of cake of which a print is to be made. Allow the blotter to absorb all the ink mixture. Place this, ink side up, on a board and work the ink into the blotter with a camel's hair brush. By means of thumb tacks stretch tightly a piece of thin, soft, smooth, even-textured cloth over this. Allow it to stand 5 or 10 minutes to absorb ink. All excess ink should be wiped off. Cut a piece of cake, ½ to ¾ inches in thickness, with a clean cut surface. Using the slice of cake as a stamp and the blotter as a pad press lightly with the tips of the fingers over the whole surface in order that every cell may have a film of ink. Transfer the cake to the paper on which the print is to be made. Illustrations are given.

Ruth Buchanan.

**Determination of unsaponifiable matter in wheat flour, alimentary pastes and eggs.** Raymond Hertwig and L. H. Bailey. J. Assoc. Official Agr. Chemists 9, 122-4 (1926).—The direct $Et_2O$ extract of flour and eggs does not contain all the unsaponifiable matter of these materials. Hertwig's acid hydrolysis extraction method (C. A. 17, 2621) apparently has some chemical action on the unsaponifiable matter which causes low results for flour and egg. The official A. O. A. C. neutral method for lipoid extraction of flour, alimentary pastes and eggs gives the highest results, is believed to be the most satisfactory from the standpoint of operation for general purposes, and seems to be the most accurate.

A. Papineau-Couture.

**(Flour) ash.** H. L. Thompson. Am. Miller 54, 160 (1926).—The ash of a patent flour contains approximately $P_2O_5$ 50, $K_2O$ 35, CaO 7, MgO 7, $Na_2O$ ⅜ and $Fe_2O_3$ ½%. The Mg increases in the lower grades while the Ca decreases. The other constituents remain almost constant. The percentage of ash is only indicative of flour grade. Usually a flour with high ash content is low in grade. There is no close correlation between the ash content and baking quality. Ash determination is of great value in the control of the operation of a mill. Ash content of flour depends on (1) the ash content of the wheat, (2) the cleaning of the wheat, (3) tempering, (4) grinding, (5) bolting or sifting, (6) operation of the purifiers, (7) proper separation and blending of the mill streams. A method is given for making an ash determination of flour.

L. H. Bailey.

**Moisture in wheat and flour.** M. L. Thompson. Am. Miller 54,266 (1926).—Moisture in flour is important because of its influence on keeping quality and because of its relation to the laws regarding net weight. In wheat high moisture content increases the rate of respiration of the grain which causes heating with its resulting damage to the flour produced from that wheat. The control of moisture in flour is not an easy matter, since it is influenced by (1) original moisture of the wheat, (2) vitreousness of the wheat, (3) amount of water added in tempering, (4) length of temper, (5) atmospheric conditions. Wheat moisture is determined rapidly and accurately by use of the Brown-Duvel moisture tester. For the determination of moisture in flour various methods are being investigated by the American Association of Cereal Chemists and the Association of Official Agricultural Chemists.

L. H. Bailey.

**Some observations on making ash determinations.** D. A. Coleman and Alfred Christie. Cereal Chemistry, 2, 391-7 (1925).—Ash determinations were made on 5 commercial straight grade flours in an electric muffle. It was found that a temperature of 485° failed to oxidize completely and at 585° fusion starts and is complete in some samples at 600° and in all samples at 685°. The most uniform results are obtained by heating for 16 hours at 585°. By the use of the Hertwig and Bailey method (cf. C. A. 19, 1459) flour can be ashed in 3 hours. To insure rapidity of oxidation, dishes not higher than 20 mm. should be used. Fusion of ash causes high and irregular results.

Ruth Buchanan.

**The fundamental requirements of a diet.** C. O. Swanson. Northwestern Miller 145, 1167 (1926).—Tables show the percentage of the different chem. elements found in the human body and the mineral composition of wheat and mill products. A discussion follows showing the kinds of proteins to use to get the essential amino acids: lysine, necessary for growth, and tryptophan, necessary to maintain life. Milk, meat and eggs are excellent supplements to white bread.

L. H. Bailey.

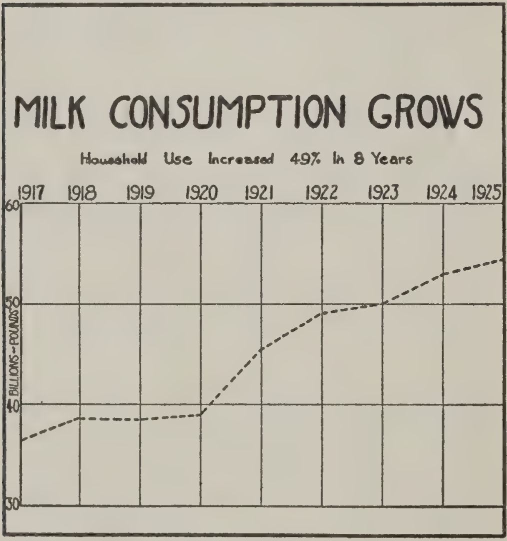
**Determination of moisture in wheat and flour.** IV. Harry Snyder and Betty Sullivan. Ind. Eng. Chem. 18, 272-6 (1926); cf. C. A. 19, 1605.—Fifty-eight flour moisture tests obtained by drying in a current of H yielded 0.54% more moisture than vacuum oven drying at 100° and 600 mm. and upwards. Flour moisture results are relative rather than an absolute expression of moisture content.

Ruth Buchanan.

HOME ECONOMICS DEPARTM
UNIVERSITY OF ILLINOIS

## *Will Baking Industry Profit by Similar Work?*

As millers and bakers are planning their campaign to increase the consumption of cereal foods they may get inspiration by studying the splendid results the dairy interests have secured by the educational campaign they started in 1917. In the eight years the National Dairy Council has carried on an organized campaign for the larger use of fluid milk the household consumption has increased from 36,500,000,000 pounds to 54,326,000,000 pounds. This is an increase in the domestic use of fluid milk of approximately 49 per cent.



The per capita milk consumption is now estimated by the U. S. Department of Agriculture to be about 1.2 pints per day. Less than half of the milk produced in the United States is used in the home. The greater portion of the supply is manufactured into ice cream, cheese and powdered and canned milk. The largest use for powdered milk is in the manufacture of bread. Eighty-five per cent of all butter manufactured is spread on bread and if it were not for cheese sandwiches, the consumption of cheese would be far less than it is.

The interests of the dairyman and the baker are closely allied. By the use of similar educational methods it should not be difficult to increase the consumption of baked products as successfully as the dairy interests have the use of milk. Ten years from now it will be interesting to compare the use of cereal products with present day consumption.

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## *Starchy Food*

By Winifred Stuart Gibbs

It is perfectly natural to translate facts about food to one's own individual experience. The realization that too much meat will be bad for Mrs. Smith's kidney trouble is not nearly so interesting to the average individual as information that too much sugar is bad for some one's liver. Although we should try to cultivate a sort of social mindedness about food as about other interests in life, the individual interest is one worth capitalizing.

It so happens that one of the half understood and often misinterpreted food facts relates to "starchy foods."

One of the first bits of advice to the over-stout is, "cut out starch." The housewife who aspires to serving carefully planned meals is apt to say, "Do not eat too many starchy foods at the same time."

As a matter of fact, comparatively few have a truly intelligent idea of the actual place of starch in the diet.

Starch is one of the great energy foods. True, energy is derived from every food eaten, but starch and sugar are in a class by themselves. Starch, by the way, is changed to one form of sugar before digestion, and this fact offers a radical reason for not powdering a thick dust of sugar on one's breakfast cereal.

—The N. Y. Telegram.

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# BAKING TECHNOLOGY

*A Journal of Applied Science in Baking*

*Published by The American Institute of Baking*

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# Rodeos and Conferences

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RIDE with the tide to Atlantic City. That is the slogan which will bring the baking industry in all its diversified branches to the 29th annual convention of American Bakers Association. It is a catchy slogan, rich with suggestions of surf and sandy beach, of a holiday from business and a gathering of old friends. It emphasizes the value of vacations in the routine of daily life and adds its own appeal to the call to conference of bakers and allied trades.

But there is more in annual conventions than golf and bridge and bathing. And each convention brings a larger group of business men together to sum up the progress of the year and plan constructively for the future.

The rodeos are giving way to conferences and pleasure round-ups; while they still play an important part in stimulating convention interest are after all but a minor factor in the week's work.

So it will be at Atlantic City, where the program of events is filled with general and group meetings, with addresses by men and women of national reputation in the field of industry and of nutrition, with business luncheons and dinners, with round table discussions, and with opportunities from early morning until midnight for constructive work in building what President Schumaker has so happily called "a bigger, better, busier baking industry."

When the organization which today holds a strong leadership throughout the world of the baking industry first met twenty-nine years ago in Boston there came together the bakers who thought it would pay better to work together than to labor in selfish isolation. And for nearly a third of a century the men who have built a great industry for service on the foundations laid by centuries of craftsmen's efforts have worked together, planning, visioning, creating the organization which now functions for the welfare of every baker through American Institute of Baking, and behind their common purpose finding that it does indeed pay to labor for the general good. And the coming convention at Atlantic City will furnish substantial proof to every baker and every member of the industries which exist because they serve the baker as millers of flour, builders of machinery and manufacturers of materials that conventions passed beyond the rodeo stage and that the work of our annual conferences is directing the efforts of bakers in the shop, teachers in the schoolroom, nutrition workers in the laboratory is rapidly building a finer appreciation of the fundamental value of goods baked from flour in the nutrition of the race.

### *The Convention Plan*

It has been the purpose of the programs of the past several years to provide substantial discussions of subjects of general interest. The old plan of building a program of talks by men familiar with shop problems has been laid aside.

A national conference has no time for the discussion of particular problems except as they are of interest to bakers generally. It is profitless to require a baker of pies or cake to endure long hours of debate and argument over the relative merits and demerits of such an important question to the bread baker as the return of stales. And no longer will men patiently sit through a crowded program in the faint hope that before adjournment something may be said which will show him a way out of his dough room troubles. At Atlantic City the speakers on the general program will discuss subjects which are of some direct interest to every baker and the technical talks will be reserved for group or department meetings. In this way speakers of national reputation will bring their message to appreciative audiences, and specific problems of flour strength, of organization and sales methods, of advertising and education will be handled by experts speaking before groups of men who will participate in the discussions and find definite benefits in the debates.

The convention plan is being built up as a model for meetings of groups within the industry. It will fill every hour of the convention week with definite action. Every guest of the Association, whether member or non-member, baker or salesman, chemist or foreman, will be given the things he most desires, the discussions in which he is most interested, the opportunity he wants for meeting his friends, for attending the dinners of his alumni group and for the consideration of the problems which he must solve.

This plan is, of course, not a new one; it is successfully followed by most well knit organizations. It has been tested by many conventions of many industries.

### *Convention Meetings*

Monday is usually registration day and a day for golf and recreation. This year Monday is also a day of business for

President Schumaker is arranging a noon luncheon for representatives of the press at which the work of the week will be outlined and plans developed for broadcasting the convention features.

In the evening the executives of American Bakers Association and of the Institute and Foundation will have dinner together and discuss the work of the year.

Tuesday is Industry Day. President Schumaker and Secretary Rumsey will make their official reports. Hon. William M. Jardine, Secretary of Agriculture, will show how the baker is interested in the welfare of the farmer and how the grower of wheat for flour, of hogs and cotton for shortening, of corn for sugars, of barley for yeast, of dairy products for milk and butter, can no longer ignore the fact that the baker of bread is his chief helper, carrying the products of his labor to the dinner table.

The afternoon of Industry Day is reserved for a round table discussion of the work of the Association. If the work has been profitable, means will be found by which to create a larger interest in it. If it has failed in any way to help the baker in his effort to establish a sound business, opportunity will be found for a frank discussion of these points. At the same time the American Society of Bakery Engineers will hold its mid-year conference and the Trade Promotion Section which is developing efficient methods for moving baked products into consumption will continue the discussions which made the winter meeting at the Institute so profitable.

In the evening many groups will gather at the dining table. The Past Presidents of American Bakers Association will get together to review the progress of the industry in which they have held leadership. The Alumni of Siebel Institute of Technology will hold their annual reunion. The secretaries of bakers associations will get together at dinner to work out plans for a constructive year's work. The alumni of American Institute of Baking will meet to review the days they spent in the school and laboratories of the Institute.

### *Institute Day*

As American Institute of Baking carries on much of the constructive work of the Association, so Institute Day will stand out in the convention week with a program filled with important and valuable discussions.

The baker has succeeded the housewife in the manufacture of the family's most important food. Dr. Louise Stanley, Chief of the Bureau of Home Economics of the United States Department of Agriculture will bring to the convention the story of bread as it should be understood by the world of womankind. Does the modern woman buy bread because she finds it easy to pass the burden of baking day to the baker, or because she realizes the value of the service her baker is giving her family? What improvement must the baker make in his methods before he is given the recognition he desires as the first servant of the household?

The Metropolitan Life Insurance Company has for seventeen years operated a Welfare Division for the promotion of health and the checking of disease. This great organiaztion co-operates with health and social agencies in their program for the welfare of the individual and the community. It is spending many millions of dollars in the public service and it is finding that every dollar it spends is a profitable investment for the company. Dr. Lee K. Frankel, Vice President of the Metropolitan Life Insurance Co., will show how the work of the Institute is in a similar way producing dividends for every member of the baking industry.

### *The Baker's Nutritional Program*

Less than a year ago the Institute organized its Department of Nutritional Education. Already the work of that department has become nation-wide in its scope. With the opening of the schools after the summer vacation hundreds of teachers in every part of the country will use the educational material supplied by the Institute in teaching children how sound bodies can only be built with good food.

The work of the nutritional laboratories of the Institute and the studies which are being carried on there to show the food value of bread and cake and pie, the reports of the technical and service laboratories showing the importance of analytical control of all baking materials, and studies which are being carried on in the research laboratories will all be presented to the convention and through it to the baking industry. Many new projects will be brought out for discussion in the thought that in no other way can the needs of the baker and miller be more definitely determined.

The activities of the Rodeos held annually on the western plains bring back for one brief week the passing and almost forgotten arts of the cowboys and plainsmen. They offer no suggestions for reviving the all but extinct industry of the old cattle men—they are but spectacles for the entertainment of the curious public.

Our conferences, while still operating as round-ups of the baking industry have no interest in things of the past—they are too full of facts of the present. Their chief concern is the fulfillment of the promises the future is making to them.

---

Ask the hungry man what two and two make, and he will reply, "Four loaves."

—Indian Proverb.

## *Sandwiches to the Rescue*

WHILE the wheat farmer is worrying over the decreasing demand for his wheat in France and Italy and the miller is wondering what he can do to stay the descending curve of flour consumption it is at least heartening to note the astonishing increase in the sandwich intake. No one who has seen hundreds of Pullman loaves corded on a restaurant counter or observed the mushroom growth of "ye sandwiche shoppes" will discount the fact that sandwiches have become as staple a luncheon food as bacon and eggs for breakfast. So while the increased use of sugar, shorter working hours, less hard labor and a diversified diet may be cutting down the use of all flour products the sandwich habit, stimulated by cheese makers who have cheese to sell, meat packers who furnish the meat, jelly makers who supply the spread and every other food industry which contributes to the building of a perfect sandwich, is doubling the noonday consumption of bread and checking in no small measure the tendency to use less baker's products. George Jean Nathan, writing in the American Mercury for June, astutely observes that "one of the phenomena that engages the interest of the student of the modern American scene is the sandwich wave that has latterly engulfed the Republic." Nathan may have thought as he wrote that he was simply contributing another column to his Clinical Notes. The restaurant world knows that he was cleverly analyzing an interesting and important development in the nutritional habits of our people. Let his give the rest of his observations.

### *The Sandwich*

"As little as a half dozen years ago the sandwich industry occupied a position of relatively small importance in the American economic and social history; today it has become one of the leading industries of the country, taking precedence over soda-water, candy, chewing gum and the Saturday Evening Post. I am told that the companies that supply sandwiches to the drug-stores alone in the various large and small cities are making fortunes; that there are sandwich-restaurant impresarios in every city in the country who—up to a few years ago poor little delicatessen dealers—now wear dinner jackets every evening and own Packard Sixes, we already know. In New York City alone, there are 5,215 shops that specialize in sandwiches, and every one of them is prosperous. In Philadelphia, there are 726; in Chicago, 2,012; in San Francisco, 831; in Cleveland, 442; in Boston, 1,619; in St. Louis, 802; in the small town of Altoona, Pa., 30 as we go to press. In addition to these specializing delicatessens and the drug-stores and the candy stores, the regular better-class restaurants that, seven or eight years ago, did not deign to list the lowly sandwich on their menus, have been compelled to surrender to the demands of public taste and presently offer a comprehensive catalogue.

### *The Sandwich is Not a Fad*

"What is responsible for the comparatively sudden and enormous popularity of a victual that, readily within the memory of all of us, was confined very largely to the family pantry and the proletarian back room of Emil Schulzgraber's saloon? One can't dismiss this popularity as a fad; the roots of the thing go much deeper. Exactly what the reason is, I do not know, but I venture a guess. To argue that the popularity of the sandwich is due to its low price seems to me to be nonsense. The sandwich has gone up in price proportionately with all other food-stuffs. Even an ordinary drug-store sandwich today costs fifteen or twenty cents, and in the specialty bureaux sandwiches come as high as a dollar and a quarter. It is not the price of the sandwich that brings in the trade, but, I believe, the circumstance that it has shown an imagination and development unknown in the instance of any other comestible. The sandwich has been brought to a state of variety and virtuosity that has made the standard dishes of the American table seem excessively dull and no longer palatably interesting. There is not a taste that the sandwich, in one form or another, cannot today gratify. The shop-girl and the lady of fashion, the day-laborer and the Brillat-Savarin are alike currently able to tickle their respective fancies with it.

### *The Elementary State*

"A glance at the restaurant cards of the early nineties shows the sandwich only in its elementary state. There were then, I find, simply Schweitzer cheese sandwiches, ham sandwiches, sardine sandwiches, liverwurst sandwiches, egg sandwiches, corned beef sandwiches, roast beef sandwiches and tongue sandwiches —a measly repertoire, one will note, of just eight. Today, there are no less than 946 different recorded kinds of sandwiches.

The variety of foods at the average restaurant, large or small, expensive or cheap, is on the other hand relatively scanty. One need only compare the average restaurant bill-of-fare with even a drug-store sandwich bulletin board to appreciate how much more readily the gastronomic fancy of the average person may be gratified by the latter, humble as it is. The sandwich has beaten out the rest of the restaurant table for the same reason that the phonograph has beaten the music-box; the former plays a thousand tunes, where the best the latter could manage was a half dozen."

# BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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AUGUST 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Bakers "Ride with the Tide"*

"ON to Atlantic City the week of September 19th" is heard nowadays wherever bakers get together.

This will be the Twenty-ninth birthday of the American Bakers Association and it is proposed to celebrate it with a dinner and such entertainment as properly goes with the celebration of a birthday.

The real significance of the convention, however, is contained in the business program.

The most successful bakers in every community generally attend this Annual Convention. This raises a question which is often asked—"Are these bakers successful because they attend conventions or do they attend conventions because they have been successful and can easily spare the time and expense?" The question is worthy of consideration. Business men who stick closely to their own business year after year and do not get around to study what others are doing, may be compared to a foot that is shod too tightly. In time the foot develops corns and bunions, callouses and misshaped toes.

Bakers who attend the convention at Atlantic City will frequently during the day or night turn their thoughts back to the home bakery and as the eye in imagination covers the intervening miles, how differently everything about the bakery looks. No man can really see his own plant until he has gone away from home, talked with other bakers and then quietly sat down to look back at his own plant. In this case, distance does not lend enchantment to the view, it rather tends to show up all the faults and mistakes.

Trade associations have taken a definite place in the business world and in the opinion of many students will yield an ever-increasing influence in the business world. It has often been said that an industry is as strong as its trade association. The baking industry has not progressed as it should because of the fact that it has more than one hundred associations without any definite plan of co-operation between them.

The real work of a trade association is not done at the convention, it is done throughout the year. The convention is merely a business conference of the members of the association.

It is hoped that at the Atlantic City convention bakers will come prepared to think and speak on this subject. This opportunity comes but once a year and no baker can rightfully complain about the work of the association unless he comes to Atlantic City prepared to express his opinions publicly at the proper time.

The Convention offers the opportunity. Will the baker take advantage of it?

L. J. SCHUMAKER,
*President American Bakers Association.*

# *Be One of the Gang*

ONCE in a while there is a man so peculiarly constituted that he really enjoys being lonely, who would rather be off to one side by himself than in the party. But that is not the natural inclination of most men. They want to be in on the fun, take part in the exchange of talk, in short, be one of the gang.

The annual conventions of American business men offer greatest opportunity for safely gratifying that desire for business companionship. The fear of the competitor leaves their mind as they get to know and understand each other better. New friendships are formed. Instinctively the newcomer to the convention throws back his shoulders, and like the new boy just moved into the neighborhood is anxious to measure up to their standard and be taken in as "one of the gang."

At the National convention last year a baker was commenting on the unusually high type of men and women he was meeting and getting acquainted with. It was his first national convention. "But, of course," he remarked, "they are the best, or they wouldn't be here." And in those few words he gave the strongest reason for attending the Association conventions. Those things worth while at the Convention. wide-awake, successful bakers have learned to expect to meet others from all parts of the country, exchange ideas, and hear They know they would never have such opportunities just staying at home; not that there are not a lot of good ones at home, too narrow in their interests or too indifferent to go to the great school held for them every year.

So the "best" are to be found at the annual convention. They get that way by rubbing elbows with their fellow bakers, playing together, swapping experiences, and going back home with a new enthusiasm. L. A. R.

# *Chemistry in World Affairs*

THAT the importance of chemistry in the affairs of the world is being recognized more and more by leaders in thought and statesmanship is common knowledge. Whether chemists will come out of their laboratories long enough and often enough to give to the world the full benefit of their investigations and the proper guidance resulting therefrom is a matter still to be determined. One significant opportunity along this line has been provided in the coming conference on "The Role of Chemistry in the World's Future Affairs," now being held at the 1926 session of the Institute of Politics at Williamstown, Mass.

An important feature of the conference will be the two lectures on the two subjects, "Food" and "Health." In the discussion of "Food" the first topic will relate to "Soil Conservation," and Dr. Jacob G. Lipman, director of the New Jersey Experiment Station, will deliver the principal address. The subject, "Economics of Food Surpluses," will be handled by Dr. W. D. Richardson who will present data, suggestions and conclusions based upon his experiences in the packing industry.

Dr. E. B. Forbes, director of the Institution of Animal Nutrition of Pennsylvania State College, will speak on "Food Utilization," from the standpoint of human needs, the animal as a converter, foodstuffs as industrial raw materials, or other methods of food utilization.

The general conference of the week will have the summary presented by Dr. H. E. Barnard, president of the American Institute of Baking.

Out of this conference may come a keener appreciation of the importance of adequate nutrition in building the race of the future. Every manufacturer of food should have a deep interest in the meeting.

# Rye Bread Problems

By C. B. Morison
*American Institute of Baking*

THE average American consumer has a predilection for wheat bread, and it is not surprising that for every barrel of wheat flour consumed by the bakers of this country only a little less than nine pounds of rye flour are used as calculated from available statistics of annual flour consumption.

If this proportion is converted into terms of bread, the ratio between rye and wheat is still wide, though subject to variation in different parts of the country.

Various millers of rye flour, and some bakers have speculated on the underlying causes for the low level of rye bread consumption and in explanation of it, have suggested several ingenious arguments, including the influence of the Volstead Act, and the changing food habits and bread tastes of the inhabitants of such rye bread strongholds as Milwaukee, and other cities just as famous in former days.

While it may be that there has been a decline in the production curve of rye bread in some parts of the country, it is well known that most bakers produce various types of rye bread which are demanded by their local trade, and that some of them who specialize in rye bread have no reason for complaint.

### *Rye Bread Is Nutritious*

Rye bread is fundamentally a nutritious and basic food possessing desirable characteristics of flavor and taste which admirably supplement those of the more widely consumed wheat breads. Rye bread could be made more popular if the housewife could be brought to see the desirability of including it in the family bread quota for the purpose of providing variety and added appetite appeal to her problem of three meals a day. We all know that in many hotels and restaurants of the better class it is customary to serve both rye bread and wheat bread, and it is common experience to observe with what zest their patrons attack the rye bread and liberal portions of butter. A visit to the latest American innovation dedicated to sandwiches is also convincing that most people like rye bread, and in spite of the fact that many Americans only know rye bread at the restaurant and sandwich counter, there exists a potential taste for rye bread that only needs cultivation by those interested to make it more popular on the family table of the home.

The baker's problems in the production of rye bread are highly complicated from the technical standpoint, but primarily, he is above all concerned with making those types of rye bread that the customers of his locality prefer, and as is well known this is influenced by their original nationality. It thus follows that there are almost as many kinds of rye bread produced in this country as there are nationalities, or local and sectional preferences.

### *Rye Breads Vary Widely*

This situation is well recognized by bakers and most rye millers, though not so well known to the public. It is quite common also to find that European travelers who come to the United States for a visit complain that they cannot get the type of rye bread that they are accustomed to in some of our cities, but that in others they find it possible to obtain the same kind of bread as they use at home. Dissatisfied with the rye bread of one city, they are satisfied with the product of another. It is therefore quite impossible to lay down specifications for rye bread characteristics that will meet with the general approval of all the bakers and all the consumers, although much could be done to improve and simplify formulas and processes for many kinds of rye bread that are now made in various sections of this country.

It is not our purpose to discuss the many formulas and methods that are employed by bakers in making rye bread as this is a technical subject which requires detailed treatment, but we might mention that here is a fine field of investigation for the bacteriologist and chemist, and that intensive study of some of the problems involved might lead to a more scientific control of the process, especially in the case of the sour rye doughs.

The results which have thus far been obtained in this field have been promising and there is good reason to venture the prediction that the rapid production and controlled acidity of sour rye bread is technically possible. This kind of an investigation should be supported by those interested in the production of rye bread.

### *What Is a Desirable Rye Flour?*

The problem of what qualities constitute a desirable rye flour in relation to use in a desired type of rye bread is also complicated by individual preferences, and the rye miller is obliged to determine in advance the ideas of his customers. The usual chemical control tests which are applied to all grades of wheat flour, do not appear to be used extensively for testing rye flour. It is exceptional for the American Institute of Baking to be called upon to make an analysis of rye flour. The determinations of moisture, protein, ash and crude fiber is sometimes used for control purposes, but the intangible factors in which bakers are more interested such as color, flavor, keeping qualities, age freshness and suitability for use are apparently left to the individual judgment of the buyer with little attention to the other factors.

**Table I.—Rye Flour Analysis**

| Description Sample | Moisture % | Protein % | Ash % |
|---|---|---|---|
| Pure White ....... | 11.46 | 6.72 | 0.642 |
| Med. White ........ | 10.37 | 8.13 | 1.103 |
| Pure Dark Clear.... | 9.82 | 12.37 | 2.073 |
| Pure White ....... | 12.53 | 7.43 | 0.693 |
| Med. Light ........ | 12.74 | 9.10 | 0.840 |
| Rye Gold .......... | 12.75 | 7.93 | 0.810 |
| Straight .......... | 11.89 | 9.80 | 0.931 |
| Dark ............. | 12.38 | 12.51 | 1.991 |
| Trade Name ....... | 13.35 | 7.33 | 0.774 |
| Trade Name ....... | 13.34 | 6.77 | 0.645 |
| Dark ............. | 10.79 | 14.04 | 1.615 |

Rye flours obtained from various rye millers, spring of 1926. Analyses made at the American Institute of Baking.

### *Rye Flours Are Little Understood*

Such problems as the aging and stability of rye flour do not seem to have received much attention from the cereal chemists in this country, though it seems to be common opinion that rye flour ages more rapidly than wheat flour, and that it is also more rapidly subject to deterioration. Some bakers appear to be emphatic in the opinion that a freshly milled rye flour is more suitable for use than a flour which has been stored for any length of time, and that storage causes loss of flavor and baking properties; but there does not seem to be much experimental data available on these points. Probably one of the reasons why American cereal chemists have devoted little attention to rye problems is because of their relative unimportance when compared with those of wheat. In Germany and other northern European countries where the production of rye bread has been brought to an admirable degree of technical excellence through years of experience, the problems of rye flour have received considerable scientific attention from the chemist.

### *Rye and Wheat Proteins*

Just why it is that rye flour does not form gluten as wheat flour does when treated with water, is a most interesting problem, but at present a satisfactory explanation for it is not possible in spite of some very suggestive work on the subject. The proteins of rye flour, while similar to those of wheat are probably not identical with them, and rye flour contains peculiar gum like carbohydrates, the influence of which on gluten formation has not yet been thoroughly worked out. Since it is common practice for the American baker to blend rye flour with wheat flour in order to obtain volume and other loaf characteristics, the above problem has little practical significance at present, but if it were possible to so modify the proteins of rye that a bread comparable to wheat might be produced it would be a most important advance.

The nutritive properties of rye are similar to those of wheat, and several American nutrition investigators have made important contributions to this subject. Osborne and Mendel, for example, have shown that the proteins of the four cereal grains, wheat, rye, barley and oat are not widely different in their efficiency in promoting growth. It has also been found that the vitamin content of rye is also similar to that of wheat.

The fuel or calorific value of the usual types of rye bread is about the same as for white bread, somewhat less than 1200 calories per pound.

The proteins, carbohydrates, and ash, are also similar in amounts to the percentages found for wheat bread, but as might be expected the fat content is somewhat lower. The crude fiber or roughage content is usually somewhat higher than white bread, depending, of course, on the grade of flours which have been used.

### *The Value of Advertising*

Since the Wisconsin Association of rye millers has a direct interest in any work which may have an influence on bringing the merits of the different types of rye bread more prominently before the housewife it would seem desirable to discuss ways and means by which this may be accomplished. Informative advertising, of course, suggests itself, which in the present state of development in the food industries has become more co-operative on the basis of nutritive food combinations.

Technical investigations concerned with the problems of the baking value and other properties of rye flour have been previously referred to, as well as studies of the various methods employed in making rye bread with a view to their simplification, better control and more uniform baking results.

The American Institute of Baking has already been able to make a start in this work in connection with the biological study of sour rye doughs, and offers its co-operation on rye flour and bread problems in any way that would be effective for the mutual interests of the baker, miller and consumer.

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"Baking Technology is very highly valued in this office. We look forward to the receipt each month and it is always looked over with much interest and enjoyment by each one in the office."

M. B. Wannamaker,
Managing Editor, Western Dietitian.

# Food Facts for the Baker's Use

By Winifred Stuart Gibbs*

*Food Specialist*

THE progressive baker does well to bend every energy to the production of quality products, but he should not stop there. True, the consumer is reassured by the knowledge that the products furnished by his baker are made of pure materials compounded with skill. As a matter of fact, lacking such assurance he would probably change his baker, but the question is, will such assurance alone cause the average consumer to buy more bakery products? The answer is, emphatically: "No!"

All of which brings us to the consideration of the next question, which is: "What will add to consumption?" The answer to that is: "Simply expressed information in regard to the place of bakery products in a well ordered diet."

And that is why the baker should study food values! He who is equipped to reassure his customers as to any prejudices which may prevail in reference to flour foods; who knows that such foods properly used are literally the foundation stones on which the most satisfactory diets can be built; who has an answer ready for the stout woman who says, "White bread makes me fat"; who knows what to say to the timid invalid who is "afraid of white bread because it is constipating," as well as the frightened one who whispers, "And they do say it causes cancer,"—in short, the baker who knows his products is quite logically the one who can show the best sales record at the close of the year.

### *The Facts Are Important*

What facts should the baker have at his finger tips? How shall he use these facts, once they are acquired, for the purpose of increasing his sales? In the first place, he is advised to devote one section of his loose leaf shop notebook to a record of these facts until such time as he has so mastered their significance that he can talk about them as easily as he now discusses the technical details of bread-making.

With pencil in hand, then, let him make his own summary of the following facts:

I. White bread is as valuable a food as brown. Furthermore, famous specialists have established the fact that white bread builds better bone and teeth than does whole grain, although, as part of a mixed diet, all varieties of well-made bread are nourishing, wholesome food. Variety from time to time is desirable from a health standpoint. **In a mixed diet, white bread is not Constipating.**

II. It is neither necessary nor desirable to eliminate bread from a so-called reducing diet. The scientific method of planning such diets is to cut down the size of all portions, but to eat, in so far as is possible, a normal mixed diet. Here is a good reducing diet for one in normal health:

BREAKFAST
Orange, one
Lean broiled steak, 2 oz.
Dry toast, 1 slice
LUNCHEON
Creamed codfish, ½ cup Bread, one slice
Baked apple, no sugar, one
DINNER
Lean roast beef, 2 oz.
Bread and butter, 1 slice
Lettuce with lemon juice, ad lib.
One other vegetable, peas or carrots, etc., ½ cup
Canned pear, one

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* In the American Baker.

III. There is absolutely no basis for the statement that white bread causes cancer. Any one desiring chapter and verse in support of this statement may be given the following verbatim quotation from Dr. Morris Fishbein, editor Journal of the American Medical Association. Speaking before the Buffalo convention of the American Institute of Baking, Dr. Fishbein said: "There is not an iota of scientific evidence that the eating of white bread, or any other kind of bread, will cause cancer, and not the slightest reason to believe that the use of whole wheat bread will in any way prevent it." Dr. Fishbein's unqualified belief is shared by the medical profession at large, otherwise he would not be editor of its technical journal.

IV. The staunchest friend of bread does not claim that it is to be used as a single article of diet. It is, however, a satisfactory source of starch or energy. When made with milk it is a well-balanced food. Both the flour and the milk furnish body building elements.

V. The baker may think of himself as a dealer in one of the most precious forms of fuel. Flour foods are fuel foods for the bodily engine. This fuel or energy is indispensable for any one who aspires to lead a useful, normal life. This fuel is furnished by flour, by fat or shortening, and by sugar, therefore sweet rolls and cakes are especially rich storehouses.

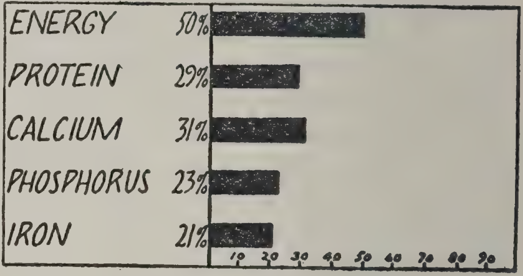
VI. Fruit pastries furnish, besides body regulating material in the form of mineral salts as contained in the fruits; iron for the blood, phosphorus to help the busy cells of the body do their work and lime for the bones and teeth, according to the variety of fruit used.

### *Charts Tell the Story*

Because of the fact that it is often easier to remember things that we have seen than those we have merely heard discussed, the baker may like to begin his

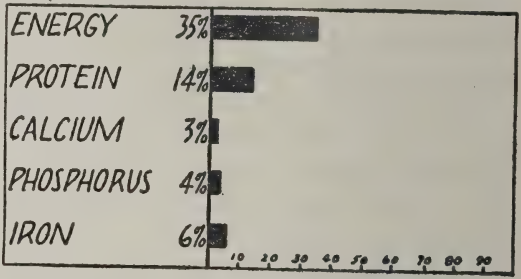
**ONE POUND OF "BUTTER" CAKE**

One pound of cake (representing seven eighths of the following recipe: ⅓ cup butter, 1 cup sugar, ½ cup milk, 2 eggs, and 1⅝ cups flour) supplies about 1,750 calories of energy, 29 grams (about 1 oz.) protein, 0.2 gram calcium, 0.3 gram phosphorus, and 3 milligrams iron. It would furnish, therefore, 50 per cent of the energy a man needs daily, 29 per cent of the protein, 31 per cent of the calcium, 23 per cent of the phosphorus, and 21 per cent of the iron. This is shown in the following chart:



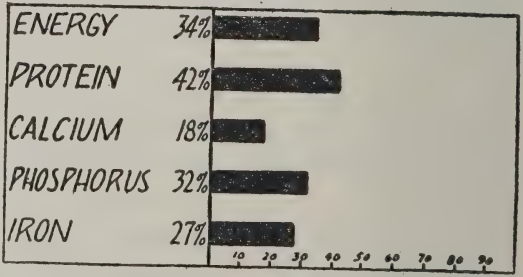
**ONE POUND OF APPLE PIE**

One pound of apple pie supplies about 2,225 calories of energy, 14 grams (about ½ oz.) protein, 0.01 gram calcium, 0.05 gram phosphorus, and 0.9 milligram iron. It would furnish, therefore, 35 per cent of the energy a man needs daily, 14 per cent of the protein, 3 per cent of the calcium, 4 per cent of the phosphorus, and 6 per cent of the iron. This is shown in the following chart:



**ONE POUND OF WHEAT BREAD**

One pound of wheat bread supplies about 1,190 calories of energy, 42 grams (about 1½ oz.) protein, 0.1 gram calcium, 0.4 gram phosphorus, and 4 milligrams iron. It would furnish, therefore, 34 per cent of the energy a man needs daily, 42 per cent of the protein, 18 per cent of the calcium, 32 per cent of the phosphorus, and 27 per cent of the iron. This is shown in the following chart:



study of food values as represented by his products with a glance at the three charts here reproduced.

These charts are from a very practical bulletin, written by Emma A. Winslow and published as Bulletin 975 by the United States Department of Agriculture. Any one may procure a copy by sending 10c to the department, Washington, D. C.

Miss Winslow, the author, is a dietitian of experience, and she shows graphically what a pound of each food studied will furnish and also how this compares with what the body requires of each of the elements represented, energy, protein or body building material, calcium or lime for bones and teeth, phosphorus for body regulating and iron for the blood.

Careful study of the facts suggested as entries for his notebook, and of the charts showing the composition of bread, cake and apple pie, will convince the baker that he is dispensing products absolutely basic in planning a nourishing diet.

### *How to Use the Charts*

With his facts collected, analyzed and stored away for ready reference, what use shall the baker make of them in his sales promotion activities? It obviously depends largely on circumstances and conditions. No discussion such as this can hope to do more than rouse interest in the subject and, perhaps, point the way to future activities by means of general suggestions, but a few such may serve a good purpose.

It is suggested that customers might be interested in studying enlargements of the charts if these were hung in the shop. Experience has seemed to show that this type of material attracts considerable attention, as interest in nutrition is ever on the increase. Smaller reproductions of the bread, cake and apple pie graphs might easily be adapted for various forms of advertising.

Then there might be a series in the local press of quarter- or even eighth-column advertisements, each one telling a bit of the interesting story of what bread does to nourish the human race. The facts suggested for the baker's notebook might serve as the basis for the advertising copy used in such a series. For example, one might bear the caption, ''No fuel strike in Blank's Bakery''; another, ''The Economical Way to Keep Your Engine in Good Condition,'' etc.

### *Window Displays Are Practical*

Again, a series of window displays would offer wide opportunity for featuring the food value of flour foods. Dolls representing especially well-nourished children might be arranged, together with displays of bakery products and appropriate legends to tell the story. The boys of the neighborhood would be apt to coax their mothers to buy bread from a baker who featured a toy engine or automobile accompanied by information regarding the fuel value of bread for the lively engines contained in children's bodies, and so on.

In some neighborhoods, teachers might be willing to enter into nutrition exhibits with the local baker. If there were, for example, a ''health food show'' in a conveniently accessible hall, weight contests for the children, bread and milk lunches, and any number of other features, could easily be staged, in which bakery products, while not overdisplayed, would play the chief part.

### *The Secret of Success*

The secret of success is first to learn well the lesson of the value of flour products and then to tell it over and over again.

To sum up: if the baker is to keep step with his times he must:

1. Remember that flour foods are well-

balanced, nonconstipating, body building and energy yielding products.

2. That they are carriers of body regulating fruits and growth promoting fats.

3. That bakery products should not be eliminated from a reducing diet.

4. That both white and dark flours are nourishing.

5. That white bread does not cause cancer.

6. That the successful baker is the one who studies first these nutritional facts and, second, new ways of getting the same facts before his public.

7. That all such work puts him in the rank of those who minister to public health and welfare.

## Sound Nutritional Logic

PLENTY of evidence is accumulating to assure those of us who value good appetites as normal and desirable things that breads made from white flour and whole wheat, from rye and corn meal, from all the cereals are all good foods. A summary of the old controversy between the relative values of different flours has been made recently by Doctors Nelson and Stroud of the Soft Wheat Milling Association. The following brief abstracts from their excellent pamphlet will be interesting.

"The popular conception prevalent about twenty years ago that about all that was necessary for a satisfactory diet was to supply sufficient protein, minerals, and energy-yielding foods has been completely revised. Today there is tangible evidence at almost every turn that the layman has now a better knowledge of the fundamentals of nutrition, or perhaps we might say a little more correctly, he is considering more of the fundamentals. This is gratifying, for the proper control of the diet is a tremendous factor in the control of health. However, it is to be regretted that too many opinions are formed from attempts to exploit scientific discoveries rather than from a full knowledge of the facts governing the situation. Clever advertisements everywhere direct the purchaser's dollar; but scientific data on nutrition experiments are accessible to only a few and can be interpreted correctly only by those who by special training understand the limitations of such experiments. How often is whole wheat bread eaten in preference to white bread because of perverted notions? How often is whole wheat bread recommended without knowing what can rightfully be expected from its use?

### *Is Whole Wheat Necessary?*

In regard to the logical position of bread in the diet and the benefits to be derived from the use of whole wheat flour, McCollum and Simmonds, in their book, The American Home Diet, state: "Whole wheat flour is superior as a food to bolted flour, provided the bread made from it is to be used as the sole food for a considerable period, as has happened and may again under conditions approaching famine. This fact is, however, of little importance in ordinary times when a variety of foods are available, for either kind of flour is incomplete from the dietary standpoint and will not long support health when used alone."

And again: "It is not probable that whole wheat flour will ever become widely used for the reasons just stated. There seems to be no good reason why the use of white flour should be discouraged. The present practice in milling returns over a quarter of the grain to the farm as cattle feed and avoids danger of loss in the distribution of that part which is used for human consumption."

### *The Dyspeptics Spectral Mien*

Apropos of the popular fad of using whole wheat bread as a panacea, the above authors in "The Newer Knowledge of Nutrition" have the following to say:

"The unfortunate individual, who, through faulty habits of living, finds at an age at which he should be still in possession of the full vigor of middle life that his efficiency is diminishing and the joy of living slipping away, has not infrequently turned for relief to substituting whole wheat flour for the staple white variety. As a rule, those who advocate this practice exhibit in some degree the spectral mien of the dyspeptic. They would gain much more through adhering to a diet well balanced than through adopting this or any other dietary whim or fad."

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## *The Pie Boarding House*

IN TELLING of his boarding house experiences as a mill man, James J. Davis, Secretary of Labor, describes the "Pie Boarding House," a place famous for its pies. He says in the Iron Puddler, his autobiography:

"The pie is an American institution. The pioneer wives of America learned to make a pie out of every fruit that grows, including lemons, and from many vegetables, including squash and sweet potatoes, as well as from vinegar and milk and eggs and flour. Fed on these good pies the pioneers—is there any significance in the first syllable of the word—hewed down the woods and laid the continent under the plow. We workers fed on proper pie, and we soon changed this wooden land into a land of iron. Now the pie is passing out and we are feeding on French pastry. Is our downfall at hand?

"Life in the Pie Boarding House was a never-ending delight. You never knew when you sat down at the table what kind of pie would be dealt you. Some of the fellows had been there half a year and swore that they had seen fifty-seven varities and were expecting new ones at any meal. The crowd here was a selected crowd. It was made up of the pie connoisseurs of mill-town."

At another boarding house he tells of a reformer who came and told the men their food was too fatty, and that they ate too much pie. In telling of this incident, Mr. Davis says:

"The burning of the oil in the engine gives the power. The burning of fats in the muscles gives the laborer his power. Sugar and starches are the next best things to fat, and that's why we could eat the thick slabs of sweet pie. We relished it well and have burned it all up in our labor in the mills. We came out with that healthy sparkle that dyspeptics never know."

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## *Does He Mean Bakers' Pies?*

An enthusiastic reader of R. H. L.'s Line which appears daily in the world's greatest newspaper sends in information to the effect that while in Panama he found a restaurant sign reading:

"Pies like Mother used to make—
5 cents.
Pies like Mother tried to make—
10 cents."

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## *Bread Fed The Boys*

Bread was one of the features of the life of the young Americans who served in France with the American Expeditionary Force. Wherever the soldier found himself on duty, there too was the good, sound nutritious bread baked by the bakery companies of the army and always supplied in quantities necessary to meet the demands of real honest to goodness appetites.

# Stability of Dough

## *Effect of Dry Skim Milk on Properties of Dough*

By Geo. W. Amidon
*Department of Research, American Institute of Baking*

It is undoubtedly true that most bakers prefer the so-called strong flours for general breadmaking purposes. There are several reasons for this preference. Strong flours will generally give them a higher absorption and more loaves per barrel than weaker flours. Strong flours will also give them loaves of larger volume, with finer grain and texture, if correctly handled, than weaker flours. Also, and not the least important, strong flours will stand more abuse in either machine or hand shops than weaker flours. They do not have to be "babied" or humored and will produce good bread over a wider range of fermentation time than weaker flours and will consistently give better results. In other words, a strong flour is more stable than a weaker flour and we are particularly interested in this property. To many bakers, stability is the most important property of the flour that they purchase, although they may not call it stability. Without knowing why, but simply through experience, they know that flour "A" will "stand up" in their shop and give them good bread day in and day out, while flour "B" will give them good bread some days and poor bread other days while seemingly handled the same way each day.

There has been a marvelous development of bakery production control in the last few years, such as the elimination of weather changes or influences by the fermentation of doughs under automatic humidity and temperature regulation, strict attention to dough and shop temperatures, and the "fordizing" of large scale production so that machines, men, and material work in organized harmony and doughs go to the makeup machinery exactly on schedule time. Practically, however, even the most perfect organizations are sometimes disrupted by the breakdown of machinery, shut off of power, and various human elements. Comparatively few bakeries at present have organizations and equipment capable of the highest degree of control. There are still many small bakeries in this country, baking bread for sale to the public, where thermometers are never used, where organization is nil, and where the equipment is either obsolete or non-existent.

We may therefore consider the stability of a flour as a factor of safety or insurance in the bakers' problem of producing bread of uniform quality from day to day. Most bakers who want the best are willing to pay a higher price per barrel for such flour, and the smaller the bakeshop and the less able it is to control production conditions, the more necessary it is for the baker to pay this premium for a flour of high stability. It is essential that the miller charge a premium for such flour because he himself must generally pay a premium for the wheat from which it is milled. The large, well-organized, modern bread factory may be well able to take a flour "bargain" and consistently make an entirely satisfactory loaf of bread out of it, whereas it might be impossible for a small bakeshop with uncontrolled conditions to do so and retain their bread in public favor, regardless of the skill possessed by the bakers in handling and fermenting doughs.

Naturally, as stability is such an important property of flour, the property of any other bread ingredient which affects or contributes to such stability is also important. That dry skim milk incorporated in a dough increases the stability of the dough is one of the little known and unadvertised properties of dry skim milk. We have, therefore, thought it helpful to report the following investigation, which illustrates this property, in detail.

In this connection, preliminary work at the American Institute of Baking and elsewhere shows surprising differences in the chemical, physical, and baking qualities of market brands of dry skim milk. Further work in this connection will eventually be done and reported to the industry and should be of value to both the milk and baking industry if results of preliminary work are confirmed.

The dry skim milk used in this investigation was a well known brand with the following analysis:

| | |
|---|---|
| Moisture | 4.12% |
| Ash | 7.79% |
| Fat | 1.21% |
| Protein (N x 6.38) | 38.52% |
| Lactose | 48.36% |
| | 100.00% |

A well and favorably known bread of spring wheat flour was selected for the experiment. Its analysis was as follows:

| | |
|---|---|
| Moisture | 12.85 % |
| Ash | .436% |
| Protein | 12.05 % |

The method of the experiment was as follows: Two doughs were mixed large enough to be divided into a number of smaller pieces. Both doughs were identical in composition except that the second had 5% dry skim milk and a little extra water to give it the same consistency as the first dough which contained no milk. Both doughs were mixed at exactly the same temperature, 80 degrees F.

At the American Institute of Baking, we have been obtaining very successful results by using the one punch method of fermenting doughs containing Arkady, that is, giving the dough a large initial rise, equivalent to 90% of the total fermentation time that is to be given it, then punching thoroughly, then allowing the dough to stand the other 10% of its total time, dividing, rounding, moulding, proofing, and baking. The correct time of the first punch, from which the total time to be given the dough is computed, is judged by the "finger indentation method" so commonly used in laboratory baking with doughs containing no Arkady. That is, the method is similar to the 60-28-12 or 60-30-10 method except that the percentages are different. A high speed cake mixer was used. Conditions were kept identical for both doughs.

After mixing, each dough was scaled into ten pieces, each having the dough weight of two loaves of bread. After fermentation, each of these pieces was divided into a individual loaf and proofed and baked separately. Thus the volume of each point on the curve is the average of the volumes of two loaves. In addition, the curves are the average of two complete experiments, so that each point on the curves is the average of four loaves of bread baked individually.

The object of the experiment, of course, is to run a series of doughs, including doughs both on the young and old side of their proper fermentation period and comparing the doughs obtained with 5% dry skim milk and without.

FORMULAE

| | Water Dough | | | Milk Dough | | |
|---|---|---|---|---|---|---|
| | Mixed Dough | Per Cent | Ind. Dough | Mixed Dough | Per Cent | Ind. Dough |
| Flour | 20 lbs. | 100 | 650 gr. | 20 lbs. | 100 | 650.00 gr. |
| Water | 13 lbs. | 65.0 | 422.5 gr. | 13.75 lbs. | 68.75 | 447.68 gr. |
| Sugar | 10 oz. | 3.12 | 20.0 gr. | 10 oz. | 3.12 | 20.00 gr. |
| Salt | 6 oz. | 1.87 | 12.0 gr. | 6 oz. | 1.87 | 12.00 gr. |
| Yeast | 5 oz. | 1.56 | 10.0 gr. | 5 oz. | 1.56 | 10.00 gr. |
| Shortening | 7.5 oz. | 2.34 | 15.0 gr. | 7.5 oz. | 2.34 | 15.00 gr. |
| Dry Skim Milk | none | none | none | 1.0 lb. | 5.00 | 32.50 gr. |
| Arcady | 45.4 gr. | .50 | 3.25 gr. | 45.4 gr. | .50 | 3.25 gr. |

Temperature of both doughs exactly 80 degrees F.
Dough weight of individual dough (Water Dough) 1132.75 gr.
Dough weight of individual dough (Milk Dough) 1190.43 gr.

BAKING DATA

Water Dough

| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Time of 1st Punch-Min. | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 |
| Time to Bench-Min. | 83 | 100 | 117 | 133 | 150 | 166 | 183 | 200 | 217 | 233 |
| Proof Time-Min. | 73 | 64.5 | 64.0 | 65.0 | 65.55 | 62.5 | 65.5 | 66.5 | 72.0 | 72.5 |
| Volume of Loaf-cc. | 2194 | 2063 | 2102 | 2162 | 2193 | 1992 | 1934 | 1949 | 1989 | 1959 |
| Total Score of Loaf | 87.0 | 88.25 | 89.0 | 90.0 | 90.75 | 89.25 | 87.0 | 84.75 | 82.25 | 80.62 |

Milk Dough

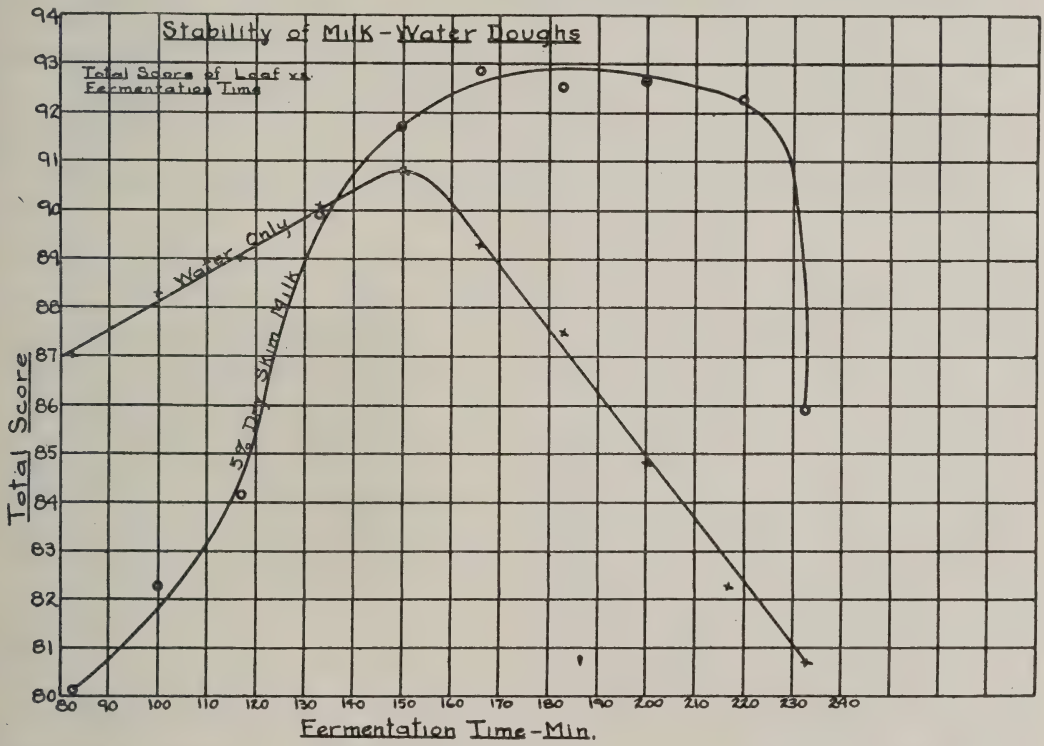
| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Time of 1st Punch-Min. | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 |
| Time to Bench-Min. | 83 | 100 | 117 | 133 | 150 | 166 | 183 | 200 | 217 | 233 |
| Proof Time-Min. | 74 | 68.5 | 65 | 64 | 61.5 | 63 | 61.5 | 64 | 61.5 | 62 |
| Volume of Loaf-cc. | 2051 | 2047 | 1982 | 2239 | 2289 | 2229 | 2195 | 2118 | 2168 | 2135 |
| Total Score of Loaf | 80.12 | 82.25 | 84.12 | 89.87 | 91.7 | 92.87 | 92.5 | 92.62 | 92.25 | 85.87 |

It will be noted that the batches fermented individually and from each of which two loaves were baked of approximately 1 lb. net weight, were unequal in weight, the formula weight for the individual batches being 1132.75 gr. in the case of the dough without milk and 1190.43 gr. in the case of the dough with milk. The graphs were made on the basis of the loaves obtained fom the above weights of dough. The volumes graphed were therefore larger for the milk dough than would be obtained from an equal weight of dough in each case. To make the relationship between the volumes correct, the factor $\frac{1132.75}{1190.43}$ equals .9515 would have to be applied to the volumes of the bread with milk. Commercially, the baker would obtain extra yield from this milk dough rather than extra volume as the extra weight of dough would be applied to additional loaves of bread.

### Conclusions

(1) The graphs emphasize the increased stability of dough containing 5% of dry skim milk as compared to doughs containing no milk.

(2) It is shown by the curve on which total score is plotted against fermentation time, the total score being the aggregate of all the properties of the bread, that the period of best loaf formation is from 15-45 minutes longer in fermentation time than in the case of the dough without milk. This is a 10-30% increase in fermentation time with this milk, this flour, and this baking procedure.



(3) The graphs emphasize the difficulty or even inability of obtaining a good milk loaf if the milk doughs are taken on the "young" side. Milk doughs must be given adequate fermentation if satisfactory results are to be expected. This is a point well known to some bakers, but there are still very many in the industry who incorporate milk as if it were so much extra flour and without any idea that it is changing the properties and characteristics of their dough to an appreciable extent.

(4) In addition, there is another point which is admittedly conjectural. There is no data to support it, only a few observations made in connection with other lines of experimentation. It is hoped the reader will check the thought by observation on his own part. It seems that milk improves some flours more than others and it might seem reasonable to assume that the influence of milk on some flours would be even greater than on the type of flour noted above, and on other flours possibly less. So-called weakness in flours may be due to a number of inherent factors, prominent among which is the physical quality of the gluten. It may be that dry skim milk has a tendency toward improving the properties of weak flour gluten.

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# Artificial Color in Cakes

By Hon. I. L. Miller
*State Food Commissioner of Indiana*

**While most housewives admit the superiority of bakers bread they still prefer to make their own cake. The chief reason for this is admittedly the poor quality of much of the commercial cake. The laboratories of American Institute of Baking have recently analyzed 29 samples of jelly roll made by Chicago bakers. In 22 of the cakes the jelly filler was artificially colored to make it look as good as if it were currant or grape or raspberry jelly. Twenty-three of the cakes owed their rich yellow color to aniline dyes instead of the yolk of eggs. The Institute is making a nation wide survey to determine whether or not bakers are using artificial color in violation of state and federal laws for it believes that no real progress can be made in developing a sound cake industry until the consumer is able to purchase honest cake, made with butter and eggs instead of coal tar dyes. The law is plain. Cakes and other baked goods must be what they look to be. The position of the food authorities is well set out in the following article.**

FOOD manufacturers spend much time and effort in making their wares attractive to the sight as well as pleasing to the palate. This endeavor has brought about the extensive use of artificial colors in a wide range of food products. While harmless vegetable and coal tar dyes are permissible under certain conditions, their use requires compliance with very definite labeling regulations. Generally the presence of artificial color must be declared otherwise the food is adulterated under the terms of the Federal Food and Drug Law and under the terms of most of the State Food and Drug Laws.

The Federal Food and Drug Act declares a food to be adulterated, "if it be mixed, colored, powdered, coated or stained in a manner whereby damage or inferiority is concealed;" some state laws add, "or whereby it is made to appear better or of greater value than it really is."

When the addition of harmless color does not conceal damage or inferiority or does not make the food appear better or of greater value than it really is, its presence is merely required to be declared on the label. If, however, the food is made to appear better or if damage or inferiority is concealed, corrective labeling affords no remedy. The ruling issued by the United States Bureau of Chemistry on April first of this year relative to the use of artificial color in alimentary pastes is of great interest to all bakers. The following is quoted from this ruling: "The question as to whether damage or inferiority is concealed is one of fact to be determined in the case of each food product which is artificially colored. It is the opinion of the Bureau that the addition of artificial color to alimentary paste (noodles, macaroni, spaghetti, etc.) as usually practiced, results in concealing inferiority and that this form of adulteration cannot be corrected by the declaration of artificial color. * * * * * It is the opinion of the Bureau that alimentary pastes of every description containing added color such as to simulate an egg paste are in violation of the Food and Drugs Act even though color is declared."

Bakers, in line with men of other food

industries, have come to use artificial colors extensively. Most of these colors are used solely for decorative purposes and with one exception, yellow color, seldom perhaps conceal damage or inferiority or make the product appear of better quality. Yellow coloring, simulating the color of eggs, can be and is no doubt often used to deceive the consumer of bakery products. It lends itself for use in rolls, cakes, cookies, pies and other bakery products in which the housewife has ordinarily used eggs. **When so used it is an adulterant and cannot be corrected by labeling** in view of the above opinion from the notice of the Bureau of Chemistry to the alimentary paste trade.

The replacement of a real food, such as egg, by artificial color having no food value, is a serious offense in the light of our present knowledge of nutrition. It is well established that eggs are among the richest of foods in certain of the vitamins so essential to growth and maintenance of health. Bakers have escaped compliance with some of the labeling regulations so strictly enforced in the case of their foods because of the difficulty in the labeling of their products. However, there can be no doubt of the illegality of the sale of bakery products of whatever nature containing artificial color which are not so labeled as to convey this fact to the consumer, nor can there be but little doubt that the sale of products colored to simulate the color of eggs is illegal regardless of any label declaration.

Some bakers erroneously believe that when certified colors are used no label declaration is required. All bakers should bear in mind that ''certified'' or ''permitted'' dyes are those which have been found harmless by the Bureau of Chemistry and are therefore permitted to be used under certain conditions. The mere fact that they are certified does not mean that the baker is relieved from the observance of labeling regulations which may apply to his products.

The baker must remember that the Federal Food and Drug Law and most of the State Food Laws require the declaration of added color, no matter whether it is added directly to the product or through some ingredient, such as jelly.

## *About Constipation*

ROUGHAGE and constipation are almost synonymous terms to most people. If the bowels are sluggish, eat lots of coarse vegetables, bran and the scratchiest kind of bread, of course. The roughage gives bulk and it also pricks the bowel into increased activity, they say. But the results are far from 100 per cent on this theory. The fact is that constipation is ofttimes caused by irritation in the large bowel—a sore, tender lining membrane, that causes more or less of a constant spasm in the muscular wall. To introduce roughage in a spastic bowel is like putting salt on a sore—it irritates—it hurts—and it increases the degree of the injury. Many cases of stubborn colitis have had their genesis in unwise efforts to correct simple constipation. And, many cases of colitis are being treated by bran, graham bread and coarse vegetables in an effort to correct the stubborn constipation that usually accompanies it. Roughage is not the panacea for bowel disorders that general opinion would have you think. White bread has its place, and it pays to know your real trouble before you enter bran biscuits as a special article of diet. Yes, even such a simple thing as constipation needs the attention of a real doctor.

—A. N. Donaldson, M. D.,
in The Medical Evangelist.

# The Cooling of Bread

By I. A. Berg
*American Institute of Baking*

## Part II

## THE PROBLEM

IN an earlier paper we have shown the importance of bread cooling to the bakers. The mechanical handling of the bread from the ovens has overcome many of the difficulties encountered with racks. The necessity of cooling the bread rapidly and under sanitary conditions has been pointed out and as well the fact that attention has been given to the controlling of the atmospheric conditions surrounding bread during cooling without any definite conclusion as to the optimum conditions which should prevail. The temperature of tha bread coming from the oven, the effect of evaporation and the theory of evaporation has also been discussed.

It becomes apparent from this study that a cooling system should embody both the mechanical handling of the bread and the proper control of the air for cooling. The mechanical problem of handling the bread by conveyors appears to have been solved but, as has been pointed out above, no definite information is available as to the proper control of the air. This subject has therefore been taken as the purpose of the investigation.

A study of the problem suggested that information is required on the following points which might lead to conclusions for proper air conditions for cooling bread:

(1) A study of the methods of cooling bread in large bakeries on the conveyor and on racks with respect to rate of cooling and loss due to evaporation.

(2) An experimental study of cooling bread in various atmospheres.

(3) A comparative study of shop cooling and controlled cooling based on the findings of the experimental work.

### *Method of Cooling Bread by the Conveyor System*

It has been pointed out that there are several types of conveyors for handling and cooling bread and that they are similar in principle. It therefore appeared reasonable to believe that with few exceptions the study of one type would supply information regarding all types. The particular conveying system that was studied is known as the Smith cooler, manufactured by the Mathews Gravity Carrier Company and installed in the Atlas Bread Factory of Milwaukee, Wis.

The conveyor system operates as the connecting link from a traveling oven to the wrapping machines. By a series of belts the bread is carried from the delivery end of the traveling oven and elevated above and across the top of the oven to the main conveyor or cooler, which is suspended from the ceiling of the shipping room. The conveyor is 85 feet long by 12 feet wide and has four levels formed by wire pallets which are pinned to the conveyor chains. The bread is automatically distributed at the loading end of the conveyor on the slow moving pallets of the top level by a deflector and commences a travel of some 308 feet across and down through the four levels. When the bread has completed its journey it is automatically discharged onto belts which run to the wrapping machines. The uniform distribution of the bread over the surfaces of the cooler depends on the nature of unloading at the oven. Usually the bread rests on the surface of the conveyor as it is dumped on the belt at the discharge end of the oven. The capacity of the conveyor is about 4900—1½-pound loaves. The time to make one revolution can be adjusted to 40 minutes, 1 hour, 1 hour and 20 minutes and 2 hours. This adjustment is regulated by the temperature of the shipping room and at times, which is not infrequent, to the rate of unloading at the oven and the rate of wrapping. Over the conveyor is a large air duct which supplies cool air during the summer months to hasten cooling.

### *Conditions of the Test*

In determining the rate of cooling the shop methods for the length of time allowed to cool the bread were adhered to. Experience in running the cooler had taught the workmen that the bread was cooled best in one hour and 20 minutes for this time of the year, (November).

The obtaining of the average temperature readings for a large number of loaves during their travel was a problem of some magnitude. It has been pointed out that uniform distribution of the loaves over the surface of the cooler depended upon the manner of unloading at the oven. In some places in the cooler loaves would be bunched together closer than at other places and this condition obviously influenced the cooling of the bread. It was decided to divide up the length of each level into ten feet intervals and take temperature readings of the crumb and crust from a different loaf at each division. More average information could be obtained in this way since the loaves were bunched at some divisions and separated at others. The temperature readings of the crust and crumb were obtained with distillation thermometers. The crust temperature was taken by inserting the thermometer bulb into the loaf as close to the crust as possible. For the crumb temperature the thermometer was inserted into the center of the loaf. At various places in the conveyor the temperature and per cent of relative humidity were taken with a hygrometer.

In table 2 is presented observed data which is graphically shown in Fig. 2.

**Table 2**

Rate of Travel of Conveyor: 1 Hour and 20 Min. per Revolution. Each Reading Made on a Different Loaf.

| Time Mins. | Feet Traveled | Crust Temp. ° F. | Crumb Temp. ° F. | Atmosphere Temp. ° F. | Wet Bulb Temp. ° F. | Per Cent Relative Humidity |
|---|---|---|---|---|---|---|
| 0 | 0 | 187 | 197.5 | 100 | 85 | 55 |
| 2½ | 10 | 176 | 194 | | | |
| 5 | 20 | 169 | 188.5 | | | |
| 7½ | 30 | 160 | 178 | | | |
| 10 | 40 | 152.5 | 169 | 98.5 | 81 | 47 |
| 12½ | 50 | 140 | 163.5 | | | |
| 15 | 60 | 134.5 | 158 | | | |
| 17½ | 70 | 133 | 154.5 | | | |
| 19 | 77 | 133 | 147 | 95 | 81.5 | 57 |
| 21 | 84 | 127.5 | 145.5 | | | |
| 23½ | 94 | 124 | 142 | | | |
| 26 | 104 | 118.5 | 136.5 | | | |
| 28½ | 114 | 116.5 | 133 | 93 | 80.5 | 59 |
| 31 | 124 | 113 | 131 | | | |
| 33½ | 134 | 115 | 127.5 | | | |
| 36 | 144 | 111 | 124 | | | |
| 38½ | 154 | 113 | 124 | 91.5 | 79 | 58 |
| 41 | 164 | 107.5 | 122 | | | |
| 43½ | 174 | 107.5 | 118.5 | | | |
| 46 | 184 | 98.5 | 116.5 | | | |
| 48½ | 194 | 98.5 | 116.5 | 88 | 75.5 | 57 |
| 51 | 204 | 100.5 | 111 | | | |
| 53½ | 214 | 102 | 113 | | | |
| 56 | 224 | 95 | 111 | | | |
| 57½ | 231 | 97 | 111 | 86 | 73 | 54 |
| 59½ | 238 | 97 | 109.5 | | | |
| 62 | 248 | 97 | 107.5 | | | |
| 64½ | 258 | 97 | 106 | | | |
| 67 | 268 | 97 | 107.5 | 86 | 72 | 52 |
| 69½ | 278 | 97 | 106 | | | |
| 72 | 288 | 93 | 102 | | | |
| 74½ | 298 | 93 | 102 | | | |
| 77 | 308 | 93 | 102 | 86 | 75 | 62 |

Temperature at wrapping machine ° F.: Crust 93, Crumb 102.

It was found that the weight loss of a loaf passing through the cooler was 3.4 per cent.

### *The Cooling of Bread on Racks*

Only the most modern bakeries are equipped with conveyors for cooling bread. The majority of bread is still cooled on racks. There appears to be a lack of definite system in loading and placing racks of bread for cooling. Racks are usually carelessly loaded and then placed close to another loaded rack in the shipping room. After one or two hours' cooling the bread is wrapped and often the time allowed depends on the requirements of the shipping room. If no careful system is followed racks loaded last may be taken to the wrapping machine first. A thermometer is rarely, if ever, used to determine whether the inside of the loaf is cooled to wrapping temperature. In most cases no space is allowed between the loaves or racks for the circulation of air, thereby hindering cooling.

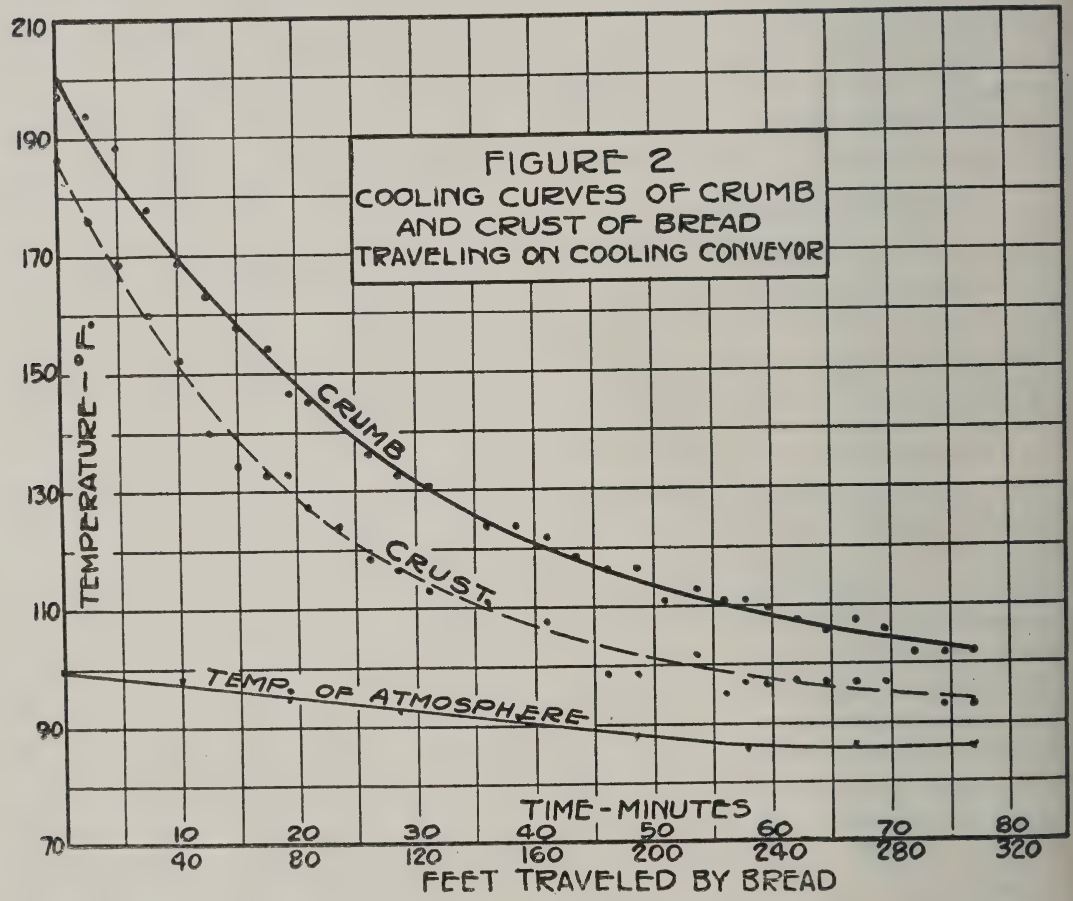


FIGURE 2
COOLING CURVES OF CRUMB AND CRUST OF BREAD TRAVELING ON COOLING CONVEYOR

It is obvious that cooling conditions in the average shipping room vary to some extent. Racks placed in a position allowing more exposure naturally cool faster. Since the majority of racks were surrounded by other racks it appeared that tests on one of these racks would be of most value.

### *The Temperature Was Observed*

In loading and setting the rack aside

for the bread to cool extreme care was taken that customary shop practice was adhered to. The rack which was loaded had ten trays each of which held 35 one-pound loaves. The men taking the bread from a traveling oven started to load the rack from the bottom up. As soon as a tray was filled the temperature of the inside of a centrally located loaf was taken and the time noted. Conditions of temperature and humidity surrounding the bread were noted by hanging a Lloyd's Hygrodeik at the bottom center and top of the rack every fifteen minutes from the time of loading until two hours thereafter. After one and two hours' cooling the temperature of the loaves first observed were again noted.

**Table 3**

| | Bottom | | | | | | | | | Top |
|---|---|---|---|---|---|---|---|---|---|---|
| Tray Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Temperature of Loaf on to Rack ° F. | 202 | 204 | 205 | 204 | 205 | 204 | 206 | 206 | 203 | 205 |
| Temperature 1 hour later ° F........ | 104 | 110 | 110 | 110 | 111 | 115 | 115 | 117 | 114 | 110 |
| Temperature 2 hours later ° F....... | 84 | 85 | 86.5 | 88 | 90 | 90 | 92 | 91 | 91 | 90 |
| 1 hour Temperature drop ° F........ | 98 | 94 | 95 | 94 | 94 | 89 | 91 | 89 | 89 | 95 |
| 2 hours Temperature drop ° F....... | 118 | 119 | 118.5 | 116 | 115 | 114 | 114 | 115 | 112 | 115 |
| Average Air Temp. ° F. for 2 hours.. | 79.25 | | | | 84.87 | | | | | 89.25 |
| Average % Relative Humidity for 2 hours ........................ | 49.63 | | | | 50.25 | | | | | 46.50 |

Average General Air Temperature ° F., 84.45.
Average General % Relative Humidity, 49.79.

In table 3 is found the observed data whch is graphically presented in figure 3. It will be observed that in the first hour of cooling the greatest drop in temperature takes place on all trays and that cooling has been more rapid in the lower five and top trays. After two hours the lower four trays show the lowest temperature and the upper six are about the same temperature. It will be noticed that the average temperature of the air at the bottom of the rack is 10 degrees lower than the average temperature of the air at the top of the rack. This would be naturally expected since a property of heated air is to rise. From this observation the conclusion is drawn that for the most efficient cooling bread should be loaded from the top down on the rack. With an average air temperature of 84.45° F. surrounding the rack the time required for the bread to cool to the safe wrapping temperature of 95° F. required almost 2 hours.

The next step was to determine the evaporation of bread during cooling on racks for 1 and 2 hours.

### *Evaporation Losses During Cooling on Racks*

From figure 3 it will be seen that the average cooling of bread took place in the center of the rack and since time did not allow for observations of all trays of a rack those centrally located were chosen for determining the evaporation losses. The bread from a traveling oven was placed on a tray and immediately weighed on a Fairbanks Standard Scale, which was previously checked with standard weights and found to be sensitive to one ounce. In each test six trays of bread divided equally between two racks which were placed adjacent to each other were observed. A hygrometer was placed in between the racks and wet and

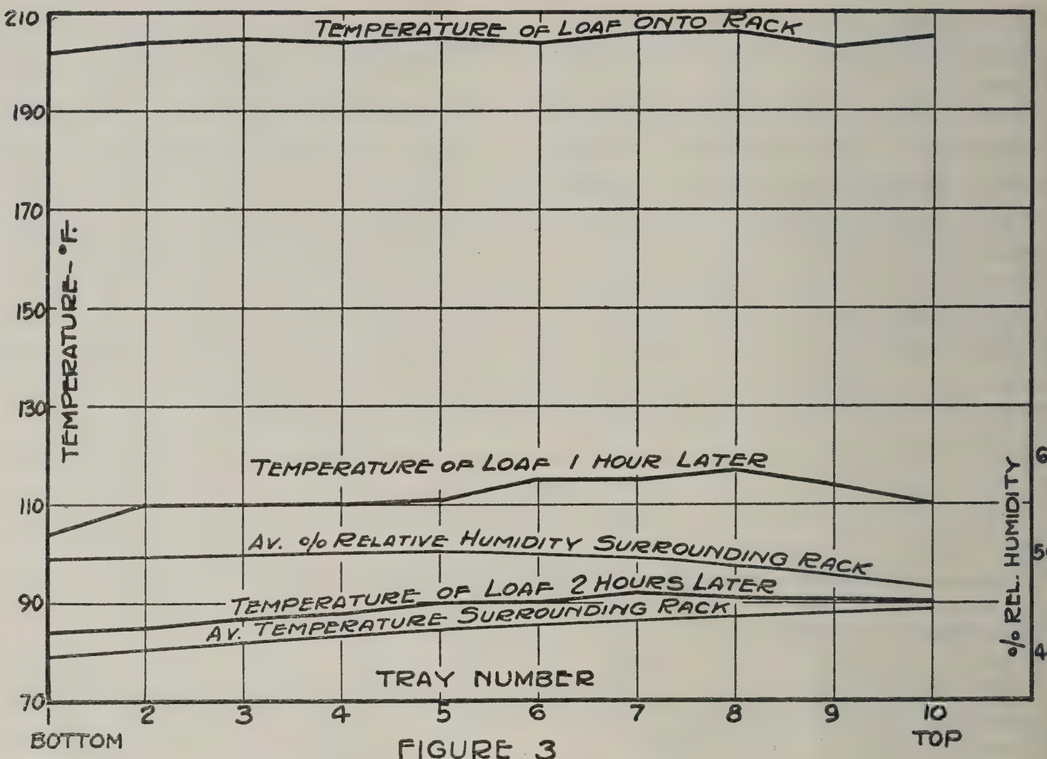


FIGURE 3
COOLING OF BREAD ON RACKS

dry bulb readings were made at definite intervals.

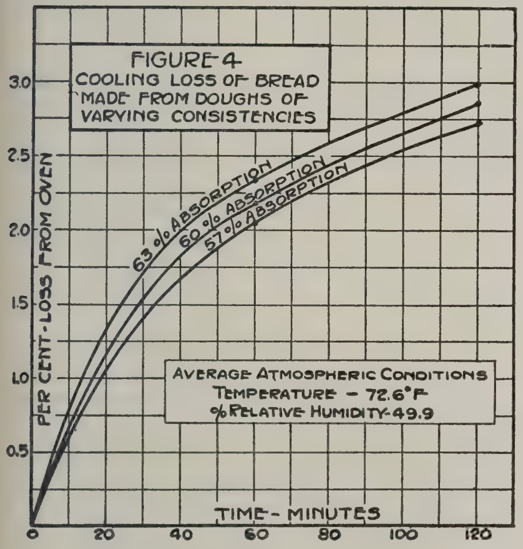
Table 4 gives the average data of six observations each made on a different day:

**Table 4—Averages of Six Trays**

| | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| Kind of Bread | 1 Lb. Split Top | 1 Lb. Split Top | 1 Lb. Plain Top | 1 Lb. Plain Top | 1½ Lb. Plain Top | 1½ Lb. Split Top |
| Average Temp. Placed on Rack ° F....... | 204 | 202 | 205 | 204 | 204 | 204 |
| Average Temp. after 1 Hr. Cooling ° F... | 114 | 108 | 109 | 112 | 107 | 109 |
| Average Temp. after 2 Hrs. Cooling ° F.. | 90 | 84 | 88 | 88 | 87 | 89 |
| Average Per Cent Loss after 1 Hr. Cooling | 3.28 | 2.88 | 2.98 | 3.20 | 3.12 | 3.43 |
| Average Per Cent Loss after 2 Hrs. Cooling | 4.02 | 3.48 | 3.54 | 3.78 | 3.71 | 4.22 |
| Average Surrounding Temp. ° F......... | 82.4 | 83.0 | 85 | 82.8 | 81.3 | 82 |
| Aver. Surrounding % Relative Humidity | 51.7 | 52.1 | 54.7 | 50.8 | 49.2 | 50.1 |

It will be seen that the average per cent evaporation losses vary to some extent, although the external conditions are almost the same. This is believed to be due to varying degrees of baking, to the consistency of the dough and the size and shapes of the loaves. That the consistency of the dough influences the evaporation loss of the bread during cooling is shown by the curves in figure 4. The data from which these curves were drawn was obtained from a shop test of three doughs made from a like formula under like conditions except for the per cent absorption which was varied from 57 to 63%.

It will be noticed that the 1½-pound loaves of bread lost about the same per cent of weight during cooling as the one-pound loaves. The average evaporation loss for one hour for all cases is 3.148 per cent and that for two hours 3.79 per cent. It was determined by previous experiments that the average oven loss during baking was around 10 per cent of the original dough weight. The above evaporation losses, represented as per cent dough weight, would be 2.83 and 3.41 per cent for one and two hours' cooling, respectively. It is hardly necessary to point out that the lowering of these evaporation losses would bring about an appreciable saving of material.



(To be continued)

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During our summer school one of the teachers recommended your pictures very highly. I would be very pleased if you would send me two of your nutrition posters.

Sister Mary Callista,
Mt. Mercy Academy, Cedar Rapids, Iowa.

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## *Fashions in Food*

"ADVERTISING has, in many cases, changed some of our food habits over night," is the observation of J. O. Dahl in his book, "Restaurant Management." "Food companies," he says' "fruit associations and life insurance companies have spent millions of dollars educating people to the value of eating more wholesome foods. The toasted sandwich is a typical example. Advertising made the toasted sandwich popular and this in turn increased the consumption of white bread. The less popular foods today are those that are unadvertised.

"The modern woman should be given credit for a large part of the better tendencies in present day eating habits. Ten years ago not more than 20 per cent of restaurant patrons were women—today it averages close to 60 per cent. The average restaurateur did not learn to cater to this new business until thoughtful women sought to compete for it and take it away from him.

"Several weeks ago I made a test to determine the popularity of the magazines publishing dietetic articles. In 14 of the 32 publications studied I found articles on good food and proper diets. Their combined circulation exceeded twelve millions.

"Progressive doctors have done and are doing a great deal to teach people the value of a correct diet. Teachers and dietitians are doing even more. Fads in foods are comparable to other fads—at times they change very rapidly. Variety is the spice of life and this applies to the menu as well. At this time there is a decided tendency toward an increase in the consumption of fruits, vegetable dinners, cheese, milk, specialty breads such as toasted raisin, French toast, nut breads and toasted sandwiches."

# Milling and Baking Chemistry

*More Abstracts of Important Papers Given Before the American Association of Cereal Chemists*

Many of the papers read at the Denver Convention discussed analytical methods used in the mill and baking laboratory. Special attention was given to the development of accurate experimental baking tests and to the rapid methods being developed for the determination of ash. Abstracts of these papers are printed herewith by arrangement with the editors of Cereal Chemistry.

**The Commercial Protein Test on Wheat.** By W. O. Whitcomb and J. P. Lewis, Montana Grain Inspection Laboratory.

The application of the protein test to the buying and selling of wheat is a comparatively recent practice. There are many problems connected with this practice which are not encountered in the testing of wheat for protein in the research laboratory.

The protein test was apparently first used by mills in December 1900 as one of the factors by which to judge wheat. As early as 1912 to 1915 protein tests by mills were becoming rather general. The first maps of territories producing high and low protein wheat were made by buyers in 1918.

The first grain inspection department to offer the protein testing service in conjunction with the grading was Oregon in 1921. This was followed by Kansas in 1922, Montana, 1923, Nebraska and Iowa (Grain Exchange) 1924, and Minnesota and Wisconsin (Grain Exchange) 1925.

The problems encountered in commercial protein testing can be summarized under the headings, (1) Sampling, (2) Relation of moisture to protein content, and (3) Relation of smut to protein content.

Wheat is frequently sampled and tested for protein two or more times. It is highly important that these tests agree within the allowable variation of two tenths of one per cent. In order to accomplish this laboratories must check closely on control tests and the sampling must be accurately done. Protein tests were made on duplicate samplings of 46 cars of wheat by the Montana Grain Inspection Laboratory. The greatest range of variation between two samplings of the same car was .40 of 1.00%. There were 41 of the 46 cars which showed .15 of 1.00% or less variation. Nine bins of wheat on farms were sampled in duplicate by means of the grain probe and tested for protein. Eight of these bins checked closer than .2 of 1.00%.

Change of the moisture content of the wheat is one of the most frequent causes of lack of uniformity of tests. The practice of computing all protein tests on the basis of 13.5% moisture is objected to by farmers and shippers in regions which produce wheat of 10% or less moisture. Another plan that has been suggested and which seems to have some merit is to state the moisture content of the wheat on the certificate with the protein test.

The opinion that smut in wheat causes an abnormally high protein test is very prevalent among farmers and dealers. Tests made in the Montana Grain Inspection Laboratory do not bear out this belief. Twenty-five lots of wheat ranging from 1.4 to 6.0% smut by scouring were tested for protein both before and after scouring. The difference in protein content of the unscoured and scoured wheat ranged from 0 to .50 of 1.00%. Nineteen of the 25 lots showed a difference of less than .2 of 1.00% protein. The presence of unbroken smut balls in the wheat caused a much greater difference in protein content than when the smut was distributed over the kernels. Of course there is no protein in smut. However, the nitrogen present in pure smut gives readings on the basis of protein ranging from 14.60% to 21.50%.

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**Factors Influencing the Viscosity of Flour-Water Suspension.** By Arnold H. Johnson, Chemistry Department, Montana Agricultural Experiment Station, Bozeman, Mont.

The temperature at which flour-water suspensions are extracted in preparing them for viscosity determinations affects the quantity of electrolytes removed, the quantity of protein removed, and the degree of hydration of the flour in suspension; the higher temperatures increasing the quantity of electrolytes and proteins removed and also increasing the degree of hydration of the flour particles in suspension.

Increasing the time of extraction at lower temperatures tends to effect the same results as are effected by exposure to higher temperatures for shorter periods of time, i. e., more complete removal of electrolytes and greater degree of hydration.

The degree of mechanical manipulation affects the quantity of electrolytes and proteins removed from a flour water suspension. The more vigorously a suspension is shaken the greater is the quantity of these materials removed.

The viscosity of acidulated flour-water suspensions depends on the quantity of electrolytes present in the suspension the viscosity of which is being determined and the degree of hydration of the flour constituents in the suspension. There are other factors which operate also but these two in particular were investigated.

The degree of hydration of the flour in suspension changes suddenly at 50° C.

Constants **b** which are identical may be obtained if the temperature at which the series of viscosity determinations are made is the same and if the determinations are made at temperatures not higher than 40° C.

Constants **a** which vary as the logarithm of the factor for converting the viscosity at one temperature to that at a higher temperature may be obtained if the constants **b** are the same.

The rate of proteolytic activity of a flour suspension can be measured by viscometric methods only if the degree of hydration of the suspended flour and the quantity of electrolytes present in the suspension can be made constant when the viscosities of several suspensions digested for different periods of time are determined.

Comparable conditions in regard to electrolytes and degree of hydration are attained when extractions of electrolytes are effected at 40° C. with several liters of distilled water.

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**Some Factors Influencing the Experimental Baking Test.** Ralph S. Herman and Victor M. Hart, The Ismert-Hincke Milling Co., Kansas City, Missouri. Illustrated with slides.

The experimental baking test is the most valuable method for determining flour quality, and serves as the guide to mill control, bakery purchase, and commercial laboratory operation.

There is some question as to the relative value of the experimental baking test, due to the variety of methods for conducting the test, as well as the formulas employed. The interpretation of results as well as the uniformity of results are readily influenced by variations in technique, method of procedure, apparatus employed, mechanical treatment and formula.

These influences are indicated in part, as relating to the effect on loaf volume, crumb and crust color, grain, and general characteristics, thru the variations of size and shape of fermenting jars and baking pans, type of water, punching schedule, severity of punches, different mixing time and speed, placement of dough crease, use of varying amounts of non diastatic and high diastatic malt extracts, powdered milk, arkady, paniplus, crisco, cane sugar, cerelose, yeast, salt, and pan greasing, the degree of freshness of the yeast, the type of yeast, the fermentation period, the proofing period, and different oven temperatures.

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**The Relation of the Crude Protein Content of Flour to Loaf Volume.** By C. H. Bailey and R. C. Sherwood.

Coefficient of correlation of crude protein content of flour and loaf volume of bread baked therefrom has been calculated in the instance of 266 samples of hard spring wheat straight grade flour milled at the Minnesota State Testing Mill during a period of five crop seasons. The coefficient was + 0.271 + 0.038. This is a significant positive correlation although it is of smaller magnitude than those reported by certain other investigators. Positive correlations of the order of + 0.7 have been observed in the instance fo studies recently made at the Minnesota Agricultural Experiment Station.

Increment increase in loaf volume with each unit increment of increase in protein content diminishes with increasing percentages of protein. A plot of loaf volume as ordinates with protein content as abscissas results in a hyperbolic curve. This hyperbolic curve can be expressed by the equation $y = \frac{x}{a + bx} + c$.

Assuming the relation $\frac{x\text{-}xk}{y\text{-}yk} = a + bx$, we have solved for the constants a and b and found $a = -0.0159112$, and $b, = +0.0022297$. Introducing these values into the equation above and solving for y (loaf volume) in terms of increasing values of x, a curve has been constructed which represents the relation between the two variables.

Although each unit of increase in protein content in the high protein material is not accompanied by a large increase in loaf volume, this does not imply that the differences in loaf volume noted are not of significance and value.

# Books for the Baking Laboratory

THE ASPERGILLI. By Charles Thom and Margaret B. Church of the Microbiological Laboratory, Bureau of Chemistry, United States Department of Agriculture, 272 pp. Williams and Wilkins Co. Baltimore, 1926.

Special knowledge concerning the identification of mold species and their behavior and activities is difficult to obtain, though it has been recognized for some years by American students of botany, mycology and biochemistry that when questions arise that require authoritative opinion valuable help could be obtained by consultation with Dr. Thom and his associates in the microbiological laboratory of the Bureau of Chemistry.

The Aspergilli has been compiled by Dr. Thom and his associate as the result of their special interest in this subject for many years. As they state in the introduction, "the beginnings of this study of the genus go back to 1904, when one of us began to investigate the part played by molds in the field of food handling."

"From the very start, species of Aspergillus were constantly encountered with equally constant enbarrassment in their identification from the descriptions available. Correspondence, exchange of cultures, and personal conference with workers in America and Europe left many of these questions of identification still unanswered. Culture by culture the accumulation of organisms grew, until in self defense we attacked the taxonomic problem, at first by groups and finally offer here a reworking of the entire genus as we have encountered it in the literature, in the field and in the culture room."

The first eight chapters of the book, including ninety pages of text is concerned with a general discussion of the Aspergilli. Some attention is given to the fermentation and industrial activities of the group and also to their pathological relations to man and the animals.

There appear to be possibilities in the industrial applications of the Aspergilli to some of the food industries. A recent example is that of the Robison patent on the fermentation of coffee for the purpose of improving the flavor of this product.

Another is that of extract and preparations of diastatic and proteolytic activity for use in baking obtained by the utilization of the Aspergillus flavus-oryzae group.

The chapter on the relation of the Aspergilli to disease is valuable and the references are important and well organized for the use of the student.

The second part of the book is exclusively taxonomic and consists of about one hundred and sixty pages of descriptive matter, including some excellent reproductions of micro photographs by Dr. Keenan.

A table of accepted species of the Aspergilli is presented and the work concludes with a valuable bibliography and index.

C. B. Morison.

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PASTEUR. Encyclopedie par L'Image, Librairie Hachette, Paris, 1926.

It is so much easier to obtain information from pictures than from text that encyclopedias are now published in which the latter has been reduced to a small proportion of the printed page.

The Librairie Hachette of Paris has initiated the publication of a series of interesting books on many subjects in art, literature and science in their picture encyclopedia.

Among them is this little book devoted to Pasteur which is so well illustrated on every page that the life of this savant, his associations and influence is actually told in pictures.

We have never seen such an extensive collection of Pasteur pictures between the covers of any one book and since it can be obtained in this country for about thirty cents, we hope that every one who is interested in Pasteur will soon own a copy.

Chemists will be particularly interested in the pictures of Pasteur's original apparatus, and the non-scientific will find plenty of "human interest" in this little book.

C. B. Morison.

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A BIBLIOGRAPHY ON RESEARCH. Selected Articles from the Technical Press, 1923, 1924, 1925, 46 pp. National Research Council, Division of Engineering and Industrial Research, 29 West 39th Street, N. Y., 1926.

This is a useful reference list of important articles appearing in the trade and technical press for the last three years on important subjects from aeronautics to wood preservation that have been assembled by the compilers to stimulate research as an industrial aid. Pages 36 to 42 on the various aspects of research in industry, present references to contributions in various trade journals of importance to all who are seeking information on the organization and results of industrial research activities.

C. B. M.

# *Abstracts of Technical Articles*

## Selected for Baking Technology from Chemical Abstracts

**The nutritive value of skim-milk powder.** L. T. Anderegg. Proc. Iowa Acad. Sci. 31, 275 (1924).—An abstract. Diets containing skim-milk powder as the source of protein and vitamins other than A produce results different from comparable diets made up from whole-milk powder. Growth is about normal or may be better than normal. Reproduction and rearing of the young are not normal. There are few or no litters, and the young almost invariably die. The period of producing the first litters may be much delayed. Addition of yeast or wheat embryo has resulted in normal growth and in the normal rearing of the first litters of young. Rats of the second generation are growing normally and appear to be in fine condition due to these supplements.

W. G. G.

**Report on the nutrition of miners and their families.** E. P. Cathcart, et al. Gt. Brit. Med. Research Council Special Rept. Ser. No. 87, 59 (1924); Expt. Sta. Record 54, 88.—This is a report of a dietary study conducted for a week on 140 families of coal miners in England. Some of the average weighted values obtained are as follows: consumption of protein 74.17, fat 97.68, and carbohydrate 444.47 grams, and total calories 3035 per man per day. Data are also given on the heights and weights for age of the boys and girls in the families studied and of the details of the diets in one of the counties.

H. G.

**Relation of sunlight to nutrition.** Anon. Wisconsin Agri. Expt. Sta. Bull. 373, 80-5 (1925).—Experiments with chickens showed that a small amount of exposure to ultra-violet light, but in no case less than 10 minutes daily, would suffice to promote normal growth. Olive oil, lard, and other substances when exposed to sunlight for some time acquired antirachitic properties. When these fats are saponified and extracted with ether, the latter became antirachitic. Six pigs exposed to sunlight, whenever possible, had heavier bones and lower blood concentrations of inorganic phosphates than 6 controls kept in the shade. Milk goats were brought into negative Ca balances and then exposed to ultra-violet light 10-20 minutes daily. The inorganic phosphorus content of the blood rose 5-8 mg. per 100 cc. and positive Ca balances were rapidly established. Green-colored legume hay will maintain cows in positive Ca balance, without any additions, but poorly cured brown hay will not maintain Ca balance even when Ca salts are added to the diet. Cows fed hay containing only 0.5% CaO gave birth to dead calves in most cases. The same hay with 2% bone meal added, enabled cows to bear normal calves.

A. L. Mehring.

**Flour grades and standards. I.** G. L. Teller. The Northwestern Miller 146, 481 (1926).—A general discussion showing the necessity for flour grades, and the chemical composition of different grades of flour. II. Ibid 580.—A discussion of the different grades of flour and the difficulties of formulating satisfactory standards.

L. H. B.

**Presence of Aspergillus fumigatus, type Fresenius in a damaged flour.** A. Sartory and R. Sartory. J. Pharm. d'Alsace Lorraine 53, 58-9 (1926).—Bacteriological examination of an organism isolated from wheat flour having a musty odor, and inoculation experiments with guinea pigs proved the presence of this parasite which is often found on the ears of cereals.

S. Waldbott.

**Saturnism and bread making.** Paul Bodros. Presse med. No. 92, 1532 (1925); Bull. soc. hyg. aliment. 14, 38-9.—An epidemic of saturnism (37 cases) at Brest was traced to the use of wood from dismantled ships for firing bread-baking ovens, the lead from the paint having evidently passed into the bread during baking.

A. P. C.

**Determination of the age of bread.** J. P. Peper. Chem. Weekblad 23, 163-8 (1926).—Katz has based a method for the determination of the age of bread on the syneresis of the starch granules on aging. Twenty grams of bread is kneaded with a large quantity of water through a fine-mesh silk gauze. The sediment formed in the filtrate after 24 hours depends on the specific gravity of the starch granules and permits estimation of the degree of syneresis. The test suffices to distinguish very fresh bread from bread older than 12 hours.

Mary Jacobson.

PROPERTY OF THE
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UNIVERSITY OF ILLINOIS

## The Waist Line

WHAT to do about that waist line? Rejoice in it, is the counsel of a more or less unprejudiced authority, the president of the American Institute of Baking, in an address before that highly judicial body, the Ohio State Restaurant Association, in convention assembled. ''America,'' says our authority, ''needs fat men and better nourished women. Unwise dieting and the use of reducing nostrums to lose weight is hurting our race. We are about the only nation in the world that is worried about getting fat. The truth is, every man and woman at a certain age should increase in weight. The waist line is not a disgrace. It is a natural thing and a sign of health and should spell comfort to its owner instead of uneasiness.'' Then Dr. Barnard, who seems to have a collateral kindly feeling for the dairy industry and the big butter-and-egg men, enters upon an eulogy of the body-rounding potentialities of custard pies.

All of which should be gratifying to the restaurant men, and poisonous to the beauty shoppes and reducing institutes. One true and striking thing our authority has said—that only Americans are worrying about getting fat; the troubles of less favored nations lie in the opposite direction. It seems to us that Republican orators should make something of this in the next campaign. We think it also correct to say that people naturally grow heavier when they leave youth behind; in England the tailors call this ''middle-age spread.'' Let us further concede that after youth is passed, people generally grow comelier as they take on weight, and that, more frequently than not, improved health is accompanied by enhanced avoirdupois. The kind of plumpness which is unfortunate is the product not of hearty eating, but of insufficient exercise. As a consequence, the back and waist line muscles grow flabby, and the flesh piles unbeautifully upon the front of the body.

Even the corpulent can possess a waist line, and not all thin persons have it. Symmetry, rather than slenderness, it seems to us, is the thing to be sought.

—Cincinnati Times-Star Editorial.

## Bread Education

ROUND on the other side of the world J. R. Wallace, editor of the Australasian Baker, has framed one of our bread, fruit and milk posters and hung it over his desk. He writes that already it has created a lot of interest among his visitors. And that Australian bakers may know what is being done in this far away country to stimulate the public interest in good bread the July magazine devotes a full page to the work of American Institute of Baking which is carrying on the campaign of bread education. Under excellent reproductions of the posters is this description of them. ''Imagine the two pictures reproduced herewith magnified to 2 ft. 3 in. in depth and beautifully printed in six colors. It is real bread advertising, and though it may be many a day before the Australian trade can follow in the footsteps of the American, these are fine examples of what can be done to make bread even more appetizing and more highly regarded as a food. An original of each poster has been sent to the editor of this journal by the American Institute of Baking, indicating again the international character of the work that is being done by this Institute. These posters are the first fruits of the work of the Institute's Department of Nutritional Education and are designed to be displayed in school rooms, libraries, show windows and health exhibits.''

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# Richness in Fact and Theory

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CARELESS phrases, loose definitions and misused facts are the cause of much of the misinformation which makes up our store of common knowledge. No field of study is more crowded with interest for the investigator than that embraced by the all inclusive statement “everybody knows.”

There are so many things which everybody knows which are far from the facts that often it is difficult to determine just what is the truth and what is fiction. And of all the old wives' tales which have crept into the mass of common knowledge none are more subject to revision nor more in need of illumination by the strong light of scientific criticism than the nutritional notions which have accumulated in the short centuries of our conscious and recorded existence.

Indeed, many of our ideas about food have no doubt come down to us from the prehistoric days when the family squatting before the cave entrance debated the advisability of satisfying hunger pangs with the contents of a clam shell. How else can be explained the strange notion that oysters are acceptable food during the months which carry an “r” in their alphabetical make-up but are unfit to eat when that letter drops out on the first of May?

Where and when did it become known

that veal steaks and pork chops should be well done but that a steak from a veal of adult age might best be relished rare? And who was first responsible for the notion that while fruit and bread and butter are excellent foods for children, the same fruit and flour and sugar and shortening served in the form of apple pie is a combination to be denied them?

Why is custard pie hardly welcome in the sick room while cup custards are urged as an excellent food for health and energy? Why indeed,—unless it is that many of our notions of what is and isn't good food are but relics of the taboos which before the days of organized knowledge made up the only defense against habits which the medicine men or other custom makers decreed to be dangerous.

### *The Book of Don'ts*

Even to list the notions about foods which we have inherited along with our red hair, blue eyes and tendency to a desirable plumpness after forty would require a book of don'ts as formidable as the statutes of a sovereign state. Food cults wax strong on their preachments that the only good food is raw food, and would condemn the world to a diet of nuts or whole grains or salads. Other groups strenuously protest the eating of meat and send up paeans of praise for the diet they have decided is the only sure way to normal life. One school advocates a low protein diet; another is inclined to the idea that cultured buttermilk is sure salvation; still another self-appointed apostle of correct living holds that no food is good food except in an unoxydized state; and following close in the wake of the efforts to increase the use of milk comes a crowd which protests the virtues of milk for adult feeding.

### *The Perils of Baked Foods*

In the chapter of don'ts which deals with the products of grain as they are prepared in the home and bakery may be found a formidable list of dietetic denials. Scan the following list of advices and try to find a single sound reason for any one of them.

Don't eat white bread
Don't eat corn bread
Don't eat whole wheat bread
Don't eat cake
Don't eat pie
Don't eat hot bread
Don't eat stale bread
Don't eat soda biscuits
Don't eat griddle cakes
Don't eat doughnuts
Don't eat bread if you would be lean
Don't eat pastries unless you would be fat

and assertions are as common as negations.

White bread makes flabby flesh
White bread makes bad teeth
White bread has no substance
Cake is unfit for children
Cake is too rich to digest
Cake is unwholesome
Pie is indigestible
Pie makes pimply faces
Doughnuts are sinkers, not food
Pastries are beauty enemies
The whiter the bread the sooner you're dead.

There is but one sure way to get at the facts. That way is not by deduction but by analysis. When facts are substituted for theories it is not difficult to answer food faddists nor to find the truth as it relates to normal nutrition. And when breads or cakes or pies in all of their acceptable forms are taken into the analytical laboratory for chemical study or used in the nutritional laboratory in determining their food value, results are obtained which overwhelm the say so statements of the still numerous and vociferous group which would prescribe for all of us the particular diet which they fancy has brought health to themselves.

### *Sound Scientific Evidence*

There is no mystery about nutrition. The animated test tube in the laboratory of life which calls itself man pours down chemicals in order to produce certain reactions of heat and energy and to create out of them new substances. There is no difference between the chemistry of the body cells and the chemistry of the laboratory. We have perhaps learned more about the reaction which takes place when silver nitrate is added to sodium chloride than we have about the role Vitamin B plays in nourishing a child.

But the same sort of scientific study will solve the last problem as it did the first. And until the facts of nutrition are dug out in the research laboratory all theories and generalities had best be laid aside as quite inadequate and probably false. Fortunately biological chemistry has in the last fifty years attracted the attention of some of the finest minds of the chemical profession and a new science of nutrition is being written into chemical literature.

It is no longer necessary to prove the value of milk as a food by deduction; the chemist has proved it through his science. The value of meat proteins is now shown by the expert in nutrition as well as by the vigor of a race which through countless generations developed from its protoplasmic state to human form largely on a diet of living organisms. And the relative values of corn, wheat or rye flours, of whole wheat bread or white bread, of cake or pie or crackers or any and all of the cereal foods which make up the chief food of mankind have been or are now being studied by the chemist whose only interest is in finding the truth.

### *A Case In Point*

No one knows better than the pie or cake baker just how seriously the notion that his products are unfit foods for children limits the growth of his business. And nothing is more important to the baker than the determination of the facts. If by some strange and subtle alchemy the process he uses in converting apples, flour, shortening and sugar into apple pie imparts indigestible qualities to the product which do not obtain when the same materials are combined as apple sauce and bread and butter, he should know it. If the simple blending of flour, eggs, shortenings and sugar into a cake produces a food too rich for large use and too concentrated for children's stomachs, the cake baker's interest in this singular fact is paramount even to that of the columnist who out of the wisdom of the ages has culled the startling idea that cake should be avoided by all beauty contest aspirants.

When the too, too plump matrons who seek dietetic advice in beauty columns are told to ''avoid rich foods'' what do they cut out of their diet? Pie and cake, to be sure,—that is, they do theoretically. To actually deny a lover of blueberry pie her full portion would develop a psychological state known as ''suppressed desire'' far more dangerous to health than a whole pantry shelf of pies.

### *What is Richness Anyway?*

As a matter of fact, neither pie nor cake is a rich food. Richness is not an attribute of sweetness, nor of high protein content. Candy is not rich, nor is a lean beefsteak. But butter is rich, ham gravy is rich, Jersey milk is rich, mayonnaise dressing is rich. Richness then is a measure of the fat content of food and not of its nutritive value. To describe a pie or cake as rich is to imagine a product which is rarely made in the home and never commercially. The term ''rich'' as it is so often applied to baked goods is wrongly used. It should be reserved for the fatty foods like pork or lamb chops, breakfast foods covered with cream, bread spread thick with butter, lettuce drenched with oil.

And all these rich foods are good foods. They form a large part of our dietary. We like them because they meet the needs of our bodies for heat and energy, for vitamins and mineral salts. If some of us, because the chemistry of our bodies is not functioning normally, find that pork chops or salads are less appetizing than other foods, we choose the other foods. Or rather, old Mother Nature tells us what to eat as she has been doing so successfully for many million years.

### *The Adequacy of Modern Bread*

There is no denying the fact that the bread of today is not the same as that of yesterday. It is a different bread, made by a different formula which has brought into the loaf the high quality proteins and mineral salts and vitamins of milk, the fine flavors of malt syrups, the valuable lime and phosphates from the foods added for yeast nutrition.

And as bakers have watched the slowly descending curve of bread consumption some of them have wondered if there was not some connection between the lessened use of bread and the changing formulas. They have indeed expressed the idea that modern bread was so ''rich'' that less of it was necessary to satisfy the appetite. Such conclusions are not in accord with our laboratory findings nor with nutritional facts. Milk, especially skim milk, adds little or no fat to bread. And the amount of shortening used in bread, whether it is added as milk, butter, lard or vegetable oil, is insignificant when compared with that added to the slice of bread or toast as it is spread before eating.

The modern bread, nutritionally adequate as it is, is not a rich bread. Nor is its total calory or energy value appreciably higher than that of bread made by the old, inadequate flour, salt, yeast and water formula. It will not satisfy hunger more fully nor stay the desire for bread more quickly than bread made by the leanest formulas. But it does furnish a well rounded food and so more fully than any other food save milk meets the need for balanced proteins, mineral salts and large supplies of body fuel.

### *For Our Children's Sake*

In spite of our food surpluses and lessened poverty, and in spite of the rapid spread of nutritional information, millions of children are malnourished. The baker furnishes their most important solid food. In his hands is placed the health problems of all future generations. He can meet this responsibility by making his bread in every way the best food for all mankind. The formulas he uses today may be still further improved. As new nutritional facts are discovered they may well fit into his efforts to add to the quality of his product.

For better than in any other way all the essentials to well nourished childhood and a vigorous and healthy adult life may be supplied in the products made from the cereal grains. In very truth bread will indeed be the staff of life.

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## *The Reducing Mania*

WHEN reducing becomes a mania disaster is usually the result, and science is called upon for the remedy, says Antoinette Donnelly in the Chicago Sunday Tribune.

A few weeks ago there was gathered in New York a body of scientists to discuss how woman can keep her boyish figure without endangering her health. The conference was called by officials of the American Medical association at the request of a popular woman's magazine deluged with requests on how to reduce weight.

During the conference it was brought out that women are taking chances with their health in their attempt to be stylish slims.

Dr. Arthur J. Cramp, director of the bureau of investigation of the American Medical association, said that the last few years have given a wonderful stimulus to one branch of quackery—the exploiters of fake or dangerous methods for reducing.

"The desire to be slender," he said, "and then more slender, to a degree often beyond what is compatible with good health, causes thousands of women to throw away money on reduction treatments that are either dangerous or worthless. Those who eat too much and exercise little are likely to become obese, and no treatment that ignores the cause of the condition can or will be effective."

In the conference it was brought out that the college girl and the flapper are not the ones most concerned with "hewing to the pencil line," that the woman who is doing the most harm in starving herself with the idea of becoming beautiful is the married woman between 30 and 50—the woman who is trying to retain her youth, and, through her own frank admissions, her husband's love.

Pretty tough for us poor females if in order to keep that mate attentive we have to live on a lamb chop and a slice of pineapple, a bran biscuit and a glass of lemonade. Wonder if he would pass up a hearty dinner by way of returning the compliment?

However, that's beside the point here, except that we have reasons to hope with the culmination of the proposed new weight chart undertaken by this body of scientific men that the starved frame may be ruled out of fashion.

---

For bread do birds fall into snares. For bread do men commit a thousand sins.

## *Bread, the Ideal Diet*

MANY things are written and said about our food which do not check with the facts. In some strange way it seems that those who know least about nutrition are most eager to suggest that their strange dietary habits are the only paths to sound and happy health. But when bread is the subject under discussion there is small room for dispute. The editor of the Cumberland, Md. Times may not be an expert in nutritional fields but he surely has a good idea of what babies, youths and adults should eat. This is what he says about the ideal diet through the span of life.

During each of the "Seven Ages of Man" white bread should be the principal item of diet. The healthy infant cuts his teeth on a partly dried crust of bread, later he is given thin slices of bread, toasted in a slow oven—or dried pulled bread. Then comes buttered or plain toast and bread and butter. By the time a child is two years old he is eating thin bread and butter sandwiches, bread custard and bread soup.

A little later he will want still more bread and butter and if he begs for jam or jelly, don't worry. This is his way of meeting the normal desire for candy.

Through the adult years the healthy hard-working individual needs bread and lots of it. The more ways in which it can be prepared and served to him, the better will he be pleased and the more health will he enjoy.

In old age and in sickness bread plays a star part. This is because bread in suitable combination is balanced, because toast is bread twice cooked—almost predigested, because bread is a vital living, concentrated food—furnishing energy, replenishing wasted energy and muscle without overtaxing the body.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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***We Work Together***

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Editorial Influence*

IS the day passing when brilliant minds and powerful pens can direct public thought through the editorial columns of the daily press?

There are to-day many editors whose opinions are followed and whose advice is sought.

But the public has come to look upon the daily newspaper as a great gathering together of news from all corners of the earth. The completeness of the news, the prominent writers engaged to conduct special departments and the division of responsibility in writing editorials is causing our daily press to lose its historic, individual editorial influence.

In fact it is probable that the creator of headlines in the news columns has wider opportunity for influence than the editorial writer.

To whom is this influence passing? It is passing into the columns of business, professional and scientific publications. In the business world it is passing to the Trade Press.

The business, professional or scientific man depends upon his trade journals, technical publications and association bulletins to furnish him with timely information and helpful suggestions. These publications do not attempt to direct his politics, religion or home life but they do discuss, in intimate terms, things pertaining to his livelihood and his opportunities for success or chances of failure.

The trade journals of our industry supply splendid educational features and furnish practical service to the baker and his allies in business. The editorial writers of these journals are men imbued with a high sense of responsibility to the baker and to the public and have a following that is envied by the editorial writers of the daily press. No industry surpasses the Baking Industry in the quality or circulation of its educational publications and trade journals.

As the Twenty-Ninth Annual Convention of the American Bakers Association, to be held in Atlantic City, N. J., the week of September 19th, draws near, all bakers and their friends will read most carefully the trade journals of the industry. In them they will find Editorial Influence shining forth on every page and in every column. The chief aim of the editor is to furnish the reader with facts and information that will enable and encourage him to do his own thinking and make his own decisions. After all, isn't that the finest kind of editorial influence?

L. J. SCHUMAKER,
*President, American Bakers Association.*

"There is an abundance of room at the top. Never in our past history has there been such fine opportunities for success in business. It is up to every man to succeed or to fail. There is no good excuse for failure."

# A Baker-Poet

WHO says that there is no romance in the baker's trade? One may glean from the pages of history many an interesting tale about famous men who were bakers by trade. Outstanding among these was Jean Reboul, the French baker who was also a talented poet.

Reboul, in fact, never deserted his baking for his versifying. His life (1796-1864) was spent in his native Nimes, a cathedral city in southern France. The son of a poor family, he was very young when his father died and he was brought up in poverty by his mother. He received little education besides what he himself acquired by observation and reading. Reboul was apprenticed to a baker and was scarcely more than a boy when he set up his own bakery at Nimes, where he continued to do most of the work for the greater part of his life.

It was the loss of his girl-wife after a few months of marriage that impelled him to find an outlet for his emotions in poetry. His first poem, "The Angel and the Child," was published when Reboul was thirty-one. The exquisite rhythm of the poem attracted the attention of Lamartine, noted French baker and statesman, who hunted up this poetizing baker and helped him to develop his talents. Later, the contrast between the beautiful poetry that flowed from his pen and the hard grind of his daily work, caught the fancy of the French press, and through it he was given wide publicity. But, although he was lionized at Paris, where he visited occasionally, he continued to work in his bakeshop.

Many French writers of distinction journeyed to Nimes to meet the baker-poet, among them being Alexandre Dumas.

In telling of his visit, Dumas said that when he arrived Reboul was busy at his trade. "You are coming to see the poet and not the baker, are you not? Know then, that from five in the morning until four in the afternoon I am the baker; from five in the evening until midnight I am the poet. If you want small loaves, remain; but if you want to talk to the poet come back at five." Just then some customers entered and Reboul went to attend to them with the remark, "You see, we cannot have a moment." Scarcely had he waited on the customers when a helper appeared and said, "Master, the bread is ready," and away went the baker into his bakeshop to put the loaves in the oven.

—From Better Bread.

# The Decline in Flour Consumption

EVERY baker who is looking forward to the day when his products will have made home baking a lost art will find the latest report from the Food Research Institute full of helpful information. If in common with manufacturers of other essentials he has learned the value of statistics in developing increased sales, he will study the data in the report entitled The Decline in Per Capita Consumption of Flour in the United States and find in the tables, charts and summaries a wealth of observations as to the causes for the lessened use of flour and many sane conclusions as to the probable trend of flour consumption in the future.

The report will be abstracted for readers of Baking Technology. Those who wish to read the full report may secure a copy by sending one dollar to the Louis Livingston Library of Baking or to the Food Research Institute, Stanford University, California.

Silver may be ever so white and gold ever so ruddy, they both have to be spent for daily bread.

—Old Danish Proverb.

# Why Less Flour Is Eaten

*The Decline in Per Capita Consumption of Flour in the United States.*
*From Wheat Studies of the Food Research Institute*

**The decline in the per capita consumption of flour in the United States is part of a complex system of changes in consumption of the various important foods. The Food Research Institute has just published a study of this decline as Vol. II, No. 8 of its series of WHEAT STUDIES. This study, as the authors point out, "considers the fundamental factors responsible for the decline in per capita flour consumption and attempts to predict their influence in the next few years". The profound effect of a continued reduction of flour consumption upon the development of the baking industry emphasizes the value of economic and nutritional knowledge to the baker. Lacking the basic facts his efforts to enlarge his business through urging increased consumption of baked products will be futile.**

STATISTICS recently compiled by the Department of Agriculture show a striking decline since 1904 in the per capita consumption of flour in the United States. Prior to 1904, per capita flour consumption in the United States changed only slightly, according to these figures, but between 1904 and 1923 it is shown to have declined over 21 per cent. If the figures compiled by the Department of Agriculture are to be trusted, the United States consumed in 1923 some 26,800,000 barrels less flour than it would have used if the 1904 rate of per capita consumption had been maintained. This amount is greater than the total flour exports of the United States in any twelve months of its history, except for one year during the war, and more than double the average annual exports of the ten years before the war.

The statistics compiled by the Department of Agriculture indicate further that the decline in per capita consumption of flour, while gradual and subject to certain interruptions, has been proceding at an increasing rate. In the fifteen years between 1904 and 1919 consumption per capita appears to have decreased 10 per cent, while in the next four years, 1919-23, it appears to have decreased 12 per cent. Does this more rapid decrease in recent years indicate that the forces which have reduced average flour consumption are steadily gaining strength and that the decline is gathering momentum? Or has the decrease resulted from certain specific changes which are not continuing and may even be reversed?

Study of the causes responsible for the decline in flour consumption per capita indicates that the most important factors have been a tendency to replace the cereals with sugar, a decrease in total food requirements per capita, a tendency to a more diversified diet, and a shift to more expensive foods generally, the last resulting chiefly from the increased prosperity of the laboring classes since the war. A minor part has been played by other factors which are discussed in detail.

### *The Causes Analyzed*

Analysis of the causes which have affected flour consumption in past years shows also the changes that may be expected in the future. Three groups of factors that have been important in the past will probably cease to operate or will have little further effect on flour consumption in the United States during the next several years. These are: first, the sudden increase in the prosperity of the laboring classes, which took place mostly between 1919 and 1923; second, the tendency to diversify the diet; and third, the decline in total food requirements per capita. The fourth factor, the substitution of sugar for the cereals, has had a profound influence in the past and may affect flour consumption even more in the future.

To judge the significance of the changes in consumption of other foods as compared with the changes in consumption of flour, it is useful to have a comparison in terms of energy values. The human body requires food both as a source of energy and for the sake of three different constituents or groups of constituents necessary for proper nutrition, namely, protein, minerals, and vitamines. Although a source of certain minerals, bread serves chiefly as an energy-producing food; it is therefore the loss in energy value from the decreasing consumption of flour and the gain in energy value from increasing consumption of other foods, that should be compared. A further reason for treating food consumption in terms of energy value is found in the fact that physiological factors exist which determine within very narrow limits, under any given conditions, the total energy value of the food which can and must be eaten.

Energy values of food are customarily measured in calories, one calorie being the amount of energy required, in the form of heat, to raise the temperature of one gram of water from 0 to 1 degree centigrade. The energy derived from food is mostly used in four different ways. First is the energy required to carry on the normal body functions when the person is at rest in a warm room; this is technically termed the "basal metabolism." Second is the energy used to maintain the body temperature when in a cool environment. Third comes the energy required for physical work. Finally, a growing child, or an adult who is increasing in weight, stores up large quantities of energy in the form of fat or other body tissue.

### *Boys Eat More Than Men*

A man of 160 pounds with customary clothing in a temperature in the neighborhood of 60° F. with light work and incidental activity, such as that of a professional man, a teacher, or a salesman, ordinarily requires 2,400-2,700 calories per day. The average woman engaged in the same general occupation needs 100-200 calories less. If the temperature is reduced without additional protection by added clothing, the caloric requirement increases. With added physical work also, more food is required; for practical purposes three calories of heat will be dissipated for one calorie transformed into work. Medium-hard physical work brings up the requirement to 3,500, still harder work another 1,000, and the most arduous occupations bring the figure up to 8,000. Boys from 14 to 18 years of age in schools with free opportunity for games consume in the neighborhood of 5,000 calories.

Most people not acquainted with the results of recent research in the field of food requirements seem to be of the opinion that the amount of food a person eats depends principally on taste and habit and in most cases far exceeds his actual food requirement. Much has been said and written, for example, of the habitual "overeating" of most Americans.

As a matter of fact, every individual who is maintaining constant weight is unconsciously regulating his eating in accordance with his actual bodily requirements. If he eats more, he gains weight, if he eats less, he loses weight.

### *The Appetite Fits the Need*

The natural means of accomplishing this adjustment is, for the most part, not through watching the scales or the fit of one's clothes and adjusting one's eating accordingly, but through the unconscious and automatic functioning of the appetite. The adjustment of the appetite to the needs of the body for energy-producing foods is so completely unconscious that most people, perhaps, are entirely unaware of its action. Yet excellent illustrations of this adjustment of the appetite to bodily requirements are familiar to everyone: fats and other "rich" foods, high in energy value, satisfy the appetite very quickly; candy eaten before dinner is likely to spoil one's enjoyment of the meal; and most people are content with very light meals for a day or two after Thanksgiving and Christmas.

There is a broad physiological basis for this doctrine of the saturation point of demand for foodstuffs. Herbivorous animals fatten during the summer in preparation for the high heat requirements and the shortage of vegetation in winter; hibernating animals fatten during the summer in preparation for the winter's fast. Carnivora tend to maintain a fairly constant body weight with some seasonal fluctuations. This has been frequently observed with dogs, These animals when underweight try to eat all food offered to them until they reach normal body weight; thereafter dogs eat such amounts of food as are necessary to maintain body weight within relatively narrow limits, ingesting more of low-calorie foods and less of high-calorie foods. In other words, the dog eats calories instead of pounds.

### *Children Are Often Underweight*

Children are like dogs underweight, and many have difficulty in eating enough to keep up the normal weight. Most adults maintain a relatively constant body weight with a certain seasonal fluctuation, unconsciously adapting their diet to this end. With some adults, the body weight tends slowly to increase with age, with others to decrease with age. There is a large group with a tendency to obesity, corresponding to selected strains of domesticated animals which tend to lay on fat instead of maintaining a constant body weight. For adults, the block of calories remains relatively constant, but there is wide variation of the components within the block—more or less cereal, more or less meat, more or less sugar, more or less bulk, but a relatively constant quantity in calories.

### *Sugar Substituted for Cereals*

Examination of the changes in per capita consumption of the various important food groups may well begin with the latest years, for which the data are more nearly complete. The marked decrease in per capita consumption of flour between 1919 and 1921 was accompanied by no significant change in consumption of corn meal, but by an almost equal increase in consumption of sugar, so that the line representing the consumption of flour, corn meal, and sugar together, in calories per capita, declines only very slightly during this period. Meanwhile the consumption of meats increased considerably and that of lard and of dairy products very slightly, resulting in a slight upward trend in the curve of total consumption in calories per capita for the six foods and groups of foods together.

### *Decreased Consumption of Other Foods*

The decline in consumption of flour between 1904 and 1919, occurring mostly in the first five years of the period, was accompanied by an even greater decline in consumption of corn meal. Sugar consumption, measured in calories per capita, increased meanwhile by almost the amount of the decrease in flour consumption, but with the sharp decline in corn meal the combined consumption of the two important cereal products and of sugar, in calories per capita, showed a substantial decrease. Adding to these the consumption of meats and lard, available since 1907, the decline appears even greater.

Prior to 1904 the decline in per capita consumption of flour was insignificant, but there was a marked decline in consumption of corn meal, offset only partially by an increase in sugar consumption.

### *Changing Amount of Food Wastage*

In studying statistics of food consumption it is important to bear in mind the fact that the statistics apply to quantities of food available at some point considerably removed from the actual consumer. One must distinguish among: first, food as reported in statistics and delivered into the trade; secondly, the same food carried through diverse acts of processing and conversion; thirdly, the same foodstuffs, some processed and others in their unaltered states, delivered by retailers to households; fourthly, the happenings between the state as purchased and as served upon the table; and, lastly, the remnants of table service that remain unconsumed. Between each of these stages and the next is a series of wastes. In other words, between the food as reported in statistics and the food as ingested are the wastes in wholesale distribution, the wastes in processing and converting, the wastes in retail distribution, the wastes in the kitchen, and the wastes on the table.

### *Much Food Is Wasted*

The wastes in the kitchen and on the table are indicated roughly by garbage collections and are usually measured in terms of fats. These wastes are very heavy and contribute an appreciable fraction of the raw materials for soap manufacture. The wastes in wholesale distribution likewise are very heavy for perishables and large even for nonperishables. The wastes in the preparation of food, whether in the home or in public eating places, are large. They vary between classes of foodstuffs, regions, years, and classes of people. It is commonly inferred that, other things being equal, waste is inverse to price; but there are many exceptions. It is commonly inferred that, other things being equal, waste is proportional to prosperity; but again there are many exceptions. Waste is modified by improvements in marketing and by developments in culinary equipment. Per capita waste is probably less in public eating houses than in homes, but we have no measure of the difference.

There is no way of evaluating a trend for any of these wastes as a gross process. Cold storage and organized rail transport have reduced the wastes of many perishables and prolonged the seasons of consumption. Centralized slaughtering of meats is less wasteful than country slaughtering. Improvements in canning and desiccation have reduced the wastes of fruits and vegetables. When sugar prices are low, canning and preserving are encouraged and waste in fruits reduced. Whether the reduction of waste by producers counterbalances the increase of waste by consumers, cannot be determined from the available data.

### *Influence of Decreasing Amount of Manual Labor*

With these facts in mind we may proceed to a consideration of the causes of the various changes. Prior to 1919 there appears a steady decline in the per capita consumption of the foods for which we have statistical data. The total decline in energy value derived from flour, corn, meal, and sugar together, during the thirty years 1889-1919, amounts to nearly 20 per cent. Was there a corresponding decline in total per capita food consumption in terms of energy value, or did the consumption of meats, dairy products, fruits and vegetables, and poultry products increase to such an extent that the total consumption of all food, in terms of calories per capita, showed a much smaller decrease or perhaps remained constant?

During the last twelve years of the period, at least, it seems quite clear that meat consumption did not increase, but rather decreased; prior to 1907 we have no data sufficient for even a reasonably reliable guess as to the trend of meat consumption. It is generally believed that since 1900 at least, the consumption of dairy and poultry products and fruits and vegetables has been increasing. Improvements in the methods of handling both these groups of products has promoted such an increase, making them readily available in good condition to a larger portion of the population and over more months of the year. At the same time there has been developing a wider understanding of the value of fruits and vegetables and dairy products in the diet. It is difficult to believe, however, that the increase in consumption of dairy products and fruits and vegetables can have been sufficient to offset the decreases in consumption in other lines. Even in the years 1911-17, dairy products, fruits, and vegetables other than potatoes supplied less than 19 per cent of the total energy value of the American diet. Altogether the evidence seems to indicate very clearly that between 1907 and 1919 there was a considerable decline in per capita consumption of all foods, in terms of energy value, and that probably this decline began at least as early as 1890. Prior to 1919 this decrease in total food consumption affected other foods as a group more than it did the consumption of flour.

### *More Machines, Less Man Power*

The statistical evidence of the decline in total food consumption is supported and explained by certain other facts. Most important of these, probably, is the increasing substitution of machinery for manual labor in many lines. The laborer doing heavy physical work requires much more food than the man engaged in more sedentary occupations. Steam shovels, automatic stokers for boilers, mechanical ditch-digging machines, conveyors in factories, agriculture machinery, and many other mechanical devices have been taking the place of man-power and increasing the proportion of the population engaged in tending machines, clerking, and other sedentary occupations requiring much less physical exertion.

The shift of workers from the heavy manual labor requiring a large expenditure of energy and high consumption of energy-producing foods to the lighter tasks of office work and machine tending, with the introduction of labor-saving machinery, has been greatly augmented by the change in general character of the industry and commerce of the nation.

### *Fewer Man Are at Hard Work*

Most significant from the point of view of effect on food consumption, has been the decline in percentage of workers engaged in agriculture, forestry, and related industries. The proportion, as shown by census statistics, has declined from over 47 per cent of the total in 1870 to about 26 per cent in 1920. These are all occupations in which a large proportion of the workers are employed at tasks requiring severe physical exertion. Furthermore, much of the work in these occupations is out of doors, where considerable amounts of energy may be required in cold weather to maintain the body temperature. The principal increases are in manufacturing and mechanical industries and trade and transportation. The increase in persons engaged in professional service from 3.5 per cent in 1880 to 5.2 per cent in 1920 has been large relatively, but not great in terms of the number of workers involved.

The amount of physical labor required in the various occupations of the manufacturing and mechanical industries and trade and transportation varies greatly, but with the extensive use of labor-saving machinery in these branches of industry there can be little doubt that the increasing relative importance of these branches at the expense of agriculture and forestry has brought about a substantial decrease in the proportion of workers engaged in heavy physical labor.

The last thirty years, perhaps especially the last ten or twenty years, have seen a notable increase in the percentage of workers employed in the lighter ''white collar'' jobs.

Altogether, the introduction of labor-saving machinery, the decreasing relative importance of those occupations which require large amounts of heavy manual labor, and the increasing proportion of office workers in most branches of industry, must have had a profound effect on the food requirements of the working population.

### *Other Influences Lessen Food Need*

Several other developments have had a bearing on total food consumption per capita in the United States. Most of them are of small importance by themselves, but their combined influence may have been considerable.

External temperature regarded as constant, there is probably increased heat dissipation from the body with modern clothing, as against the clothing of the closing decades of the last century. Both men and women wear less clothing and the character of the underclothing is such as to restrain heat dissipation less than was formerly the case. The lightening of garments of women has probably been no more effective in this direction than the dropping of heavy flannel undergarments for men. This represents an increase in heat dissipation with a tendency to increased food consumption.

On the other hand, the average heating of houses is probably higher than it was in earlier decades. Houses are now heated more uniformly to between 60 and 70 degrees; then a few rooms were heated to 70 or 80 degrees, but the sleeping rooms were usually unheated. Such a change tends to reduce the dissipation of body heat and hence to require less food to maintain body temperature.

(To be continued)

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## *What the Little Girl Said*

The Moon's the North Wind's Cooky
He bites it, day by day,
Until there's but a rim of scraps
That crumble all away.
The South Wind is a baker,
He kneads clouds in his den,
And bakes a crisp new moon that—greedy
North Wind eats again.

—Vachel Lindsay,
"This Singing World."

# The Effect of Dry Skim Milk on the Properties of Bread

By Geo. W. Amidon
*Department of Research, American Institute of Baking*

THE use of dry skimmed milk in bread is increasing even though there are some differences of opinion among bakers as to the effects of dry skimmed milk on the individual characteristics of the loaf, such as color of crumb, taste, texture, and others. The following investigation was undertaken to determine for one milk, several flours, and one set of baking conditions, just what influence was exerted by dry skimmed milk on these individual characteristics, and as far as possible, to determine its quantitative extent. Exact physical quantitative measurement of the characteristics such as taste, flavor, and texture, is technically impossible at present, and instead, scoring systems have been devised based on the experience and judgment of the operator. The American Institute of Baking system of scoring bread, which is well adapted for this purpose, was used in this work. It should be emphasized that the scoring of bread depends, except for volume which can be measured with reasonable accuracy, upon the judgment of the individual who scores the bread.

The following investigation was conducted on a laboratory scale because, for work of this kind, where a number of doughs are necessary to obtain the general trend of a curve, the more easily controlled laboratory conditions give the most reliable results. It should be emphasized also that the result of any individual experiment either in the shop or laboratory may be misleading if interpreted by itself. For reliable results a number of experiments should be performed and the results of these experiments averaged. It is probable that the same results obtained in the laboratory could be reproduced in the shop if measurements were made with sufficient accuracy.

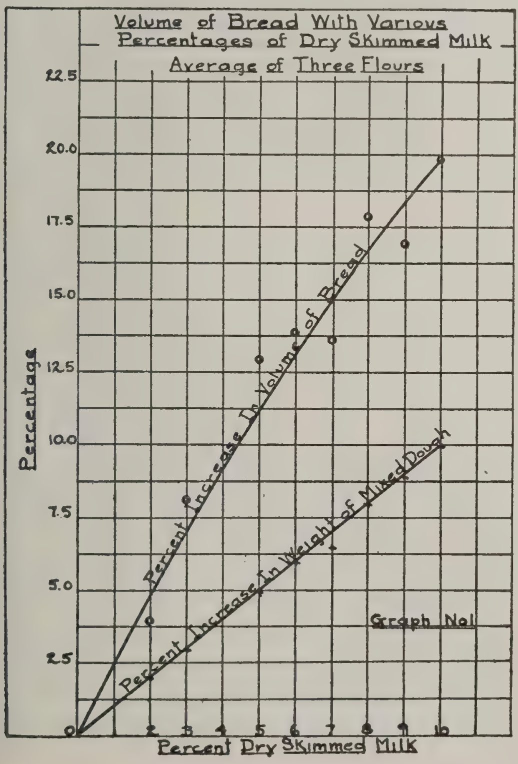
The dry skimmed milk was a well known brand with the following analysis:

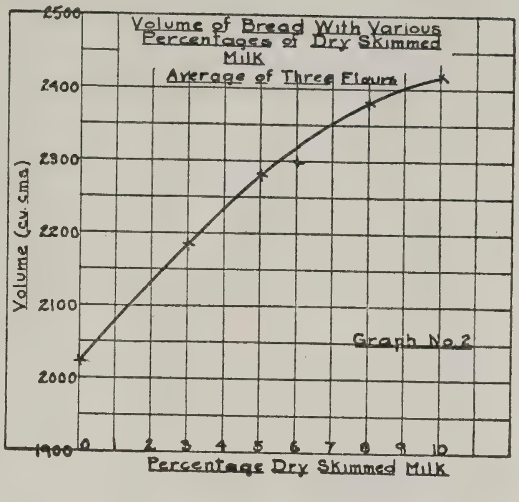
| | |
|---|---|
| Moisture | 4.07% |
| Protein (N x 6.38) | 39.25% |
| Lactose (by difference) | 47.68% |
| Fat | 1.21% |
| Ash | 7.79% |
| | 100.00% |

Three flours were used in this investigation, two winter wheat flours, and one spring wheat flour. In the graph illustrating variation of total score with percentage of dry skimmed milk, the flours are graphed separately. In the graph illustrating variation of volume with percentage of dry skimmed milk, the three flours were averaged in order to obtain a smoother curve. The curves illustrating the volume variation of the individual flours, however, showed the same trend and approximately the same quantitative variation. These curves are on file at the Institute for the inspection of anyone interested. They are omitted here for lack of space. The analysis of the three flours was as follows:

| | No. 1 | No. 2 | No. 3 |
|---|---|---|---|
| Moisture | 11.88 | 10.18 | 12.85 |
| Protein | 11.31 | 11.15 | 12.05 |
| Ash | .398 | .420 | .436 |

The method used in the investigation was as follows: Doughs were mixed containing various percentages of dry skimmed milk up to 10%, based on the weight of flour. Each of these doughs was large enough to make two loaves of bread. The doughs were fermented as a double loaf, and after fermentation was completed, the dough was divided into two pieces, proofed, and baked separately. This was done to obtain the average volume as this factor is subject to variation. It is well recognized in baking experimentation that individual volume determinations require checking. At least three experiments were made as above on each flour and the results and baking data of the three or more experiments were averaged together to make a composite average for the flour worked with. Some times as many as seven observations were made. The volume results of the three flours were then averaged for Graph No. 1 as previously mentioned. A gauge was used so that the bread was always proofed to the same height.





No attempt was made to scale the doughs to the same dough weight. The same weight of flour was used in each dough and also the same weight of other ingredients except milk and water. As a larger amount of dry skimmed milk was added to the dough, with extra water to compensate for the tightening effect of the milk, the weight of the doughs became heavier. If the milk will ''hold its own'' on volume, the volume should increase at the same rate as the weight of the dough. But the milk does more than ''hold its own'' and the volume increases at a rate practically double the increase in dough weight. The actual increase in volume in cubic centimeters is shown by Graph No. 2. In a bakery, of course, this extra dough weight or extra volume would be used to obtain an increased yield per barrel instead of a larger loaf of bread, but this investigation was only intended to yield information as to the properties of bread resulting from the superimposing of various quantities of milk upon a given formula.

Only one set of baking data is included here, that of Flour No. 1. The data for Flours No. 2 and No. 3 is not published because it is similar to that of Flour No. 1.

Baking Data (Flour No. 1)

| | | Water | 3% Dry Skimmed Milk | 5% Dry Skimmed Milk | 6% Dry Skimmed Milk | 7% Dry Skimmed Milk | 8% Dry Skimmed Milk | 9% Dry Skimmed Milk | 10% Dry Skimmed Milk |
|---|---|---|---|---|---|---|---|---|---|
| Formula— | % | | | | | | | | |
| Flour | 100.00 | 650 gr. | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| Sugar | 3.08 | 20 gr. | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Salt | 1.85 | 12 gr. | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Yeast | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Water—Variable | ... | 429 gr. | 442.28 | 451.13 | 455.57 | 459.98 | 464.42 | 468.84 | 473.28 |
| Shortening | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Dry Skimmed Milk | ... | .... | 19.5 | 32.5 | 39.0 | 45.5 | 52.0 | 58.5 | 65.0 |
| Absorption of Flour | | 66.0% | 68.04 | 69.40 | 70.09 | 70.77 | 71.45 | 72.13 | 72.81 |
| Av. Temperature of Dough (° F.) | | 80.5 | 80.75 | 80.25 | 79.5 | 79.5 | 79.25 | 80.25 | 79.75 |
| Formula Weight (gr.) | | 1141.0 | 1173.77 | 1195.63 | 1206.57 | 1217.48 | 1228.42 | 1239.34 | 1250.28 |
| Proof Time (Min.) | | 70.25 | 64.0 | 60.25 | 58.75 | 59.0 | 57.75 | 57.75 | 57.75 |
| Fermentation Period (Min.) | | 156.5 | 166.0 | 162.25 | 170.25 | 172.0 | 176.25 | 175.75 | 175.75 |

Data (Average of Flours 1, 2 and 3)

| | Water | 2% Dry Skimmed Milk | 3% Dry Skimmed Milk | 4% Dry Skimmed Milk | 5% Dry Skimmed Milk | 6% Dry Skimmed Milk | 7% Dry Skimmed Milk | 8% Dry Skimmed Milk | 9% Dry Skimmed Milk | 10% Dry Skimmed Milk |
|---|---|---|---|---|---|---|---|---|---|---|
| Av. Dough Weights | 1141.5 | ..... | 1175.53 | ..... | 1198.19 | 1209.53 | ..... | 1232.17 | ..... | 1254.85 |
| Percentage Increase in Dough Weights | ..... | 1.99 | 2.98 | 4.11 | 4.96 | 5.96 | 6.79 | 7.94 | 8.75 | 9.93 |
| Av. Volumes (cu.cms.) | 2020.4 | ..... | 2184.0 | ..... | 2280.9 | 2298.2 | ..... | 2381.6 | ..... | 2415.7 |
| Percentage Increase in Volume | ..... | 3.95 | 8.29 | 15.20 | 12.99 | 13.85 | 13.64 | 17.87 | 16.90 | 19.74 |
| Volume | 8.60 | 8.50 | 9.41 | 9.72 | 9.75 | 9.73 | 9.81 | 9.88 | 10.00 | 10.00 |
| Color of Crust | 6.41 | 6.45 | 6.86 | 7.50 | 7.42 | 7.49 | 7.81 | 7.82 | 8.00 | 7.90 |
| Symmetry of Form | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Evenness of Bake | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Character of Crust | 2.22 | 2.37 | 2.43 | 2.66 | 2.73 | 2.73 | 2.81 | 2.90 | 2.87 | 2.90 |
| Break and Shred | 1.82 | 1.66 | 2.15 | 2.37 | 2.61 | 2.64 | 2.93 | 2.90 | 3.00 | 2.90 |
| Grain | 9.00 | 9.12 | 9.14 | 9.50 | 8.94 | 9.05 | 9.18 | 8.90 | 8.87 | 8.61 |
| Color of Crumb | 8.69 | 9.00 | 9.01 | 9.00 | 9.17 | 9.16 | 9.43 | 9.12 | 9.31 | 8.96 |
| Flavor | 13.16 | 12.95 | 13.59 | 13.62 | 13.87 | 14.08 | 14.43 | 14.25 | 14.05 | 13.94 |
| Taste | 17.92 | 18.08 | 18.40 | 18.58 | 18.81 | 19.01 | 19.05 | 18.86 | 18.50 | 18.44 |
| Texture | 13.26 | 12.75 | 13.73 | 13.37 | 14.00 | 13.96 | 14.00 | 14.12 | 14.00 | 14.05 |
| Total Score of Loaves | 87.08 | 86.88 | 90.72 | 92.32 | 93.30 | 93.85 | 95.45 | 94.75 | 94.60 | 93.70 |

## *Conclusions*

1. This investigation indicates that the superimposing of dry skimmed milk with its accompanying extra water upon a given formula results in bread which has a larger volume than bread made without dry skimmed milk. The superimposing of the milk and water upon the formula re-

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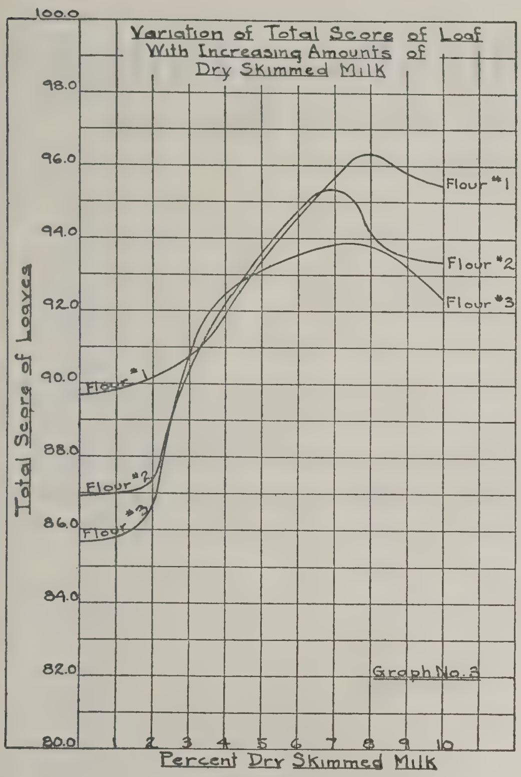

sults in a heavier weight of dough, but the increase in volume of the bread is practically double the increase in the dough weight when both dough weight and volume are calculated on a percentage basis.

2. These results were obtained with a gradual increase in fermentation time up to 12%. This latter figure was obtained with 10% dry skimmed milk. The fermentation time of the doughs was obtained by the standard 60-28-12 method. The dough containing no milk could not have stood this increase in fermentation time without deleterious effects on the bread.

3. The color of crust is progressively improved with the increase in milk. The characteristic crust color with milk is a rich golden brown that is more permanent than the crust color obtained without milk. As the lactose of milk is a sugar which is unfermented by baker's yeast, most of it remains in the dough and is caramelized during baking.

4. Symmetry of form and evenness of bake were given a uniform score of three as it was assumed that variations could only be attributed to baking conditions and not to the milk.

5. The character of the crust was better when milk was used. The effect seemed to be that of a more desirable softness and tenderness.

6. One of the most pronounced effects of milk in bread is the characteristic break and shred which results. This is hard to describe, but good milk bread shows a typical golden brown "shredded wheat" effect. It seems to have a tendency to keep the break from running "wild."

7. No significant effect on the grain was noticed until more than 7% of dry skimmed milk was used. A higher amount seemed to detract from the quality of the grain, making it coarser and more open.

8. The color of the crumb of the inside of the loaf, with this milk, was slightly more creamy with increasing quantities of milk. But although it was more creamy, it was also "brighter" and more lustrous.

9. The flavor and taste of the bread showed a gradual increase up to about 7%. After this there was a slight falling off and the taste was not as desirable.

10. The texture was softer and more velvety with increasing quantities of dry skimmed milk.

11. The total score of the loaves, which is the aggregate of the above properties, as shown by Graph No. 3, increases progressively on all three flours up to 7 or 8% and then shows a tendency to drop.

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"I find Baking Technology to be of exceeding value to me in my work throughout the state."

Sarah E. Coyne,
State Home Demonstration Leader,
Kingston, Rhode Island.

# What Is the Saturation Point?

*Results of Some Feeding Experiments with Whole Wheat Bread*

By C. B. Morison and R. H. Shaw

## PART II

THE results of a series of feeding experiments in which milk bread made according to the requirements of the Federal Standard, F. I. D. 188, comprised 25, 50, and 75 per cent respectively of the total calories of a "basic" or "complete" diet has been previously reported. (1)

When a "basic" or "complete" diet containing 25 and 50%, respectively of the total calories as milk bread, was fed to young and growing white rats, satisfactory growth was observed over the feeding period of seventy days. An increase of the milk bread component to 75% of the total calories of the diet still showed comparatively good growth, but the increases in weight of the animals was not as satisfactory in comparison with those of the animals fed on the diets containing 25 and 50% of their calories as milk bread.

The results of these experiments are of interest in connection with the problem of how much bread of a given type or composition may be introduced into the diet without causing effects which may be attributed to faulty nutrition.

The following continuation of this investigation has been concerned with the effects of feeding whole wheat bread as the component of an otherwise "complete" diet, and was conducted according to the procedure employed in the experiments with milk bread previously noted. (1)

### *The Experimental Work*

The "complete" or basic diet was prepared according to the following formula, and was identical with that used in the milk bread experiments:

| | |
|---|---|
| Casein | 20% |
| Butterfat | 15% |
| Starch | 56% |
| Salt Mixture | 4% |
| Yeast | 5% |
| | 100% |

The butter fat was prepared by melting butter at a low temperature and the clear fat separated from the sediment by decantation and filtration. The salt mixture and dried yeast were obtained from the Harris Laboratories.

The whole wheat bread was made from the following formula in the Institute Bakery:

| | |
|---|---|
| Whole Wheat Flour | 100% |
| Water | According to absorption |
| Cerelose | 2% |
| Malt Extract (Diamalt) | 1% |
| Shortening (Crisco) | 2% |
| Yeast (Fleischmann) | 2% |
| Salt | 1.75% |

The baked bread was allowed to cool and stand over night on the rack. It was then sliced and returned to the rack where it was dried at room temperature until crisp. The air dried slices were then ground in a power mill to a coarse meal. The analyses of the "basic" or "complete" diet and the air dried whole wheat bread is shown in Table I.

TABLE I

**Analyses of "Basic" Diet and Air Dried Whole Wheat Bread:**

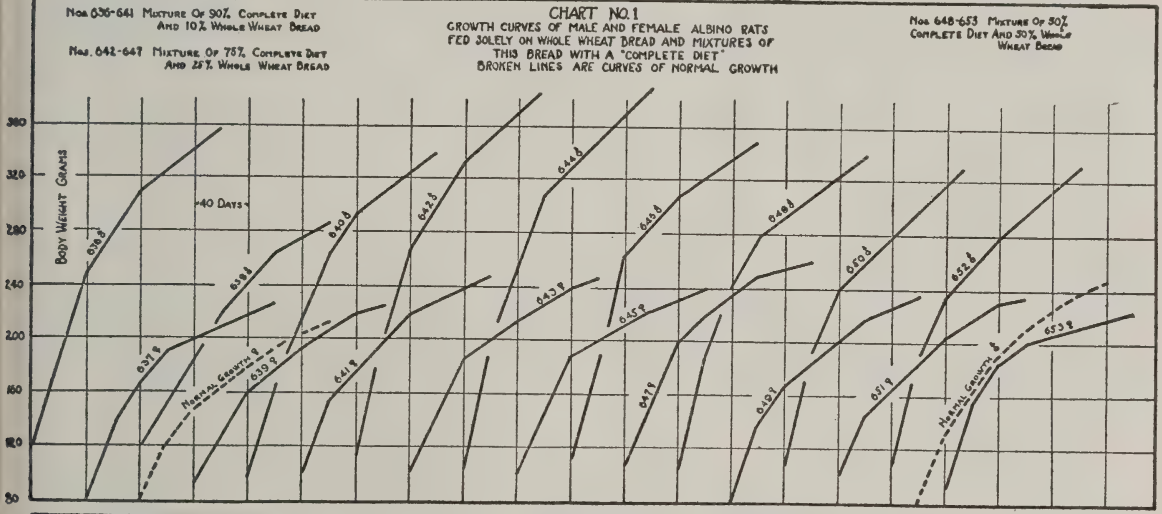
**"Basic" Diet**

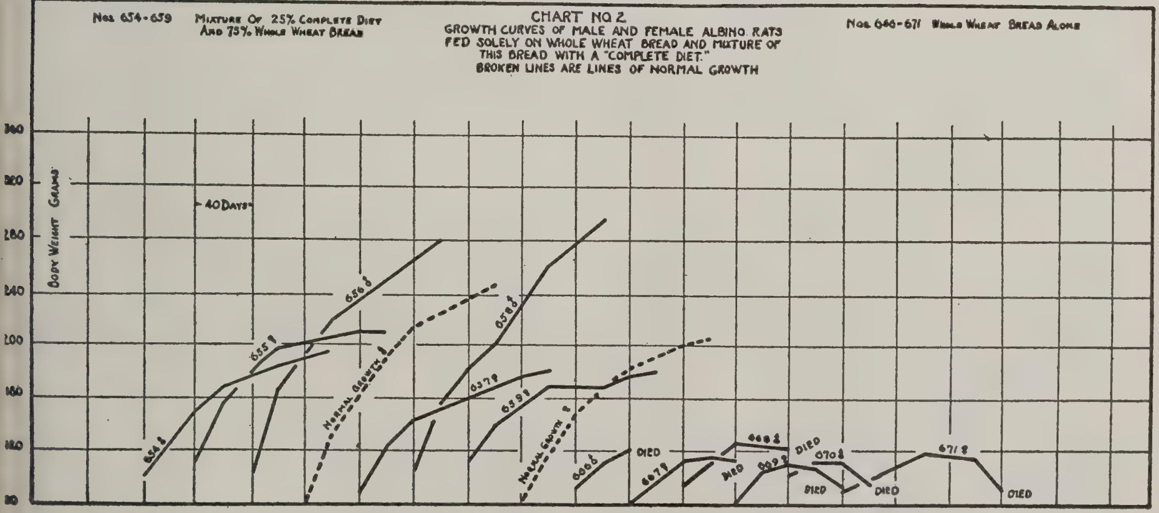
| | |
|---|---|
| Water | 7.47% |
| Protein (N x 6.38) | 18.49% |
| Nitrogen Free Extract | 54.31% |
| Crude Fiber | 0.68% |
| Fat | 15.32% |
| Ash | 3.73% |
| | 100.00% |

**Air Dried Whole Wheat Bread**

| | |
|---|---|
| Water | 9.22% |
| Protein (N x 6.25) | 14.04% |
| Nitrogen Free Extract | 67.09% |
| Crude Fiber | 2.71% |
| Fat | 3.96% |
| Ash | 2.98% |
| | 100.00% |

The calorie equivalents of the "basic" diet and the air dried whole wheat bread, respectively were calculated from the analyses shown in Table I.





Experimental diets were prepared from mixtures of the "basic" diet and the dried ground whole wheat bread containing (1) 90% of total calories as "basic" diet and 10% as dried whole wheat bread; (2) 75% of the total calories as "basic" diet and 25% as dried whole wheat bread; (4) 25% of the calories as "basic" diet and 75% as dried whole wheat bread.

Five groups of six rats each, were placed on the experimental diets as follows:

Rats 636, 637, 638, 639, 640 and 641, constituted Group No. 1 and received the "basic" diet 90% and dried whole wheat bread 10% of the total calories.

Rats 642, 643, 644, 645, 646 and 647, constituted Group No. 2 and received the

## TABLE II

### Showing Total Food Intake and Proximate Constituents of the Diets in Grams

| Animal No. Sex | Constituents of "Complete" Diet in Grams | | | | | | Constituents of Bread in Grams | | | | Constituents of Combined Diet in Grams | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diet | Total Intake | Protein | Nitrogen Free Extract | Fat | Ash | Protein | Nitrogen Free Extract | Fat | Ash | Protein | Nitrogen Free Extract | Fat | Ash |
| | 10% Bread<br>90% Basic<br>Diet | | | | | | | | | | | | | |
| 636-m | " | 1618 | 264.10 | 775.90 | 218.90 | 53.28 | 26.54 | 126.90 | 7.48 | 5.63 | 290.64 | 902.80 | 226.39 | 58.92 |
| 637-f | " | 1332 | 217.50 | 638.90 | 180.20 | 43.89 | 21.90 | 104.70 | 6.17 | 4.65 | 239.40 | 743.60 | 186.38 | 48.92 |
| 638-m | " | 1441 | 235.40 | 691.30 | 195.00 | 47.47 | 23.58 | 112.70 | 6.65 | 5.01 | 258.98 | 804.00 | 201.65 | 52.48 |
| 639-f | " | 1356 | 221.50 | 650.70 | 183.50 | 44.69 | 22.18 | 106.00 | 6.26 | 4.71 | 243.68 | 756.70 | 189.76 | 49.39 |
| 640-m | " | 1457 | 237.80 | 698.50 | 197.10 | 47.97 | 24.01 | 114.80 | 6.77 | 5.10 | 261.81 | 813.30 | 203.87 | 53.07 |
| 641-f | " | 1405 | 228.40 | 673.90 | 190.10 | 46.28 | 23.02 | 110.00 | 6.49 | 4.89 | 252.42 | 783.90 | 196.59 | 51.17 |
| | 25% Bread<br>75% Basic<br>Diet | | | | | | | | | | | | | |
| 642-m | " | 1820 | 240.60 | 706.90 | 199.50 | 48.55 | 72.71 | 347.50 | 20.51 | 15.44 | 313.31 | 1054.40 | 220.01 | 63.99 |
| 643-f | " | 1506 | 199.00 | 585.10 | 165.00 | 40.18 | 60.23 | 287.80 | 16.99 | 12.78 | 259.43 | 872.90 | 181.99 | 52.96 |
| 644-m | " | 1803 | 238.50 | 700.60 | 197.60 | 48.11 | 72.01 | 344.20 | 20.32 | 15.29 | 310.51 | 1044.80 | 217.92 | 63.40 |
| 645-f | " | 1509 | 199.50 | 586.10 | 165.40 | 40.25 | 60.37 | 288.50 | 17.03 | 12.81 | 259.87 | 874.60 | 182.43 | 53.06 |
| 646-m | " | 1712 | 226.50 | 665.30 | 187.70 | 45.69 | 68.30 | 326.80 | 19.29 | 14.51 | 294.86 | 992.10 | 206.99 | 60.20 |
| 647-f | " | 1550 | 204.90 | 602.20 | 169.80 | 41.35 | 61.90 | 295.90 | 17.46 | 13.14 | 282.83 | 898.10 | 187.26 | 54.49 |
| | 50% Bread<br>50% Basic<br>Diet | | | | | | | | | | | | | |
| 648-m | " | 1791 | 151.00 | 443.70 | 125.10 | 30.47 | 136.80 | 653.60 | 38.58 | 29.02 | 287.80 | 1097.30 | 163.68 | 59.49 |
| 649-f | " | 1512 | 127.60 | 374.60 | 105.70 | 25.72 | 115.40 | 551.70 | 32.56 | 24.50 | 243.00 | 926.30 | 138.26 | 50.22 |
| 650-m | " | 1693 | 142.80 | 419.50 | 118.30 | 28.80 | 129.20 | 617.70 | 36.46 | 27.44 | 272.00 | 1037.30 | 154.76 | 56.24 |
| 651-f | " | 1529 | 128.90 | 378.60 | 106.80 | 26.00 | 116.80 | 558.10 | 32.94 | 24.78 | 245.70 | 936.70 | 139.74 | 50.78 |
| 652-m | " | 1710 | 144.20 | 423.60 | 119.50 | 29.09 | 130.50 | 624.00 | 36.83 | 27.71 | 274.70 | 1047.60 | 156.33 | 56.80 |
| 653-f | " | 1448 | 122.10 | 358.80 | 101.20 | 24.63 | 110.50 | 528.30 | 31.18 | 23.46 | 232.60 | 887.10 | 132.38 | 48.09 |
| | 75% Bread<br>25% Basic<br>Diet | | | | | | | | | | | | | |
| 654-m | " | 1455 | 58.80 | 172.80 | 48.73 | 11.87 | 159.50 | 762.30 | 44.99 | 33.86 | 218.30 | 935.10 | 93.72 | 45.73 |
| 655-f | " | 1492 | 60.32 | 177.20 | 49.98 | 12.17 | 163.60 | 781.80 | 46.14 | 34.72 | 223.92 | 959.00 | 96.12 | 46.89 |
| 656-m | " | 1610 | 65.07 | 191.20 | 53.93 | 13.13 | 176.60 | 844.10 | 49.82 | 37.49 | 241.67 | 1035.30 | 103.75 | 50.62 |
| 657-f | " | 1269 | 51.29 | 150.70 | 42.50 | 10.35 | 139.20 | 665.50 | 39.27 | 29.55 | 190.49 | 816.20 | 81.77 | 39.90 |
| 658-m | " | 1616 | 65.33 | 191.90 | 54.14 | 13.18 | 177.20 | 846.80 | 49.98 | 37.61 | 242.53 | 1038.70 | 104.12 | 50.79 |
| 659-f | " | 1360 | 54.95 | 161.40 | 45.54 | 11.09 | 149.00 | 712.50 | 42.06 | 31.64 | 203.95 | 873.90 | 87.60 | 42.73 |
| | Whole Wheat<br>Water Bread | | | | | | | | | | | | | |
| 666-m | " | 333* | 40 days .............. | | | | 46.74 | 223.50 | 13.18 | 9.92 | | | | |
| 667-f | " | 608 | 80 days .............. | | | | 85.35 | 408.00 | 24.07 | 18.11 | | | | |
| 668-m | " | 587 | 80 days .............. | | | | 82.39 | 393.30 | 23.25 | 17.49 | | | | |
| 669-f | " | 587 | 80 days .............. | | | | 82.39 | 393.30 | 23.25 | 17.49 | | | | |
| 670-m | " | 379 | 60 days .............. | | | | 53.10 | 254.30 | 15.01 | 11.29 | | | | |
| 671-f | " | 910 | 122 days .............. | | | | 127.70 | 610.50 | 36.03 | 27.11 | | | | |

* These figures represent intake of rat until death.

"basic" diet 75%, and dried whole wheat bread 25% of the total calories.

Rats 648, 649, 650, 651, 652 and 653, constituted Group No. 3, and received the "basic" diet 50%, and dried whole wheat bread 50% of the total calories.

Rats 654, 655, 656, 657, 658 and 659, constituted Group No. 4, and received the "basic" diet 25%, and dried whole wheat bread 75% of the total calories.

Rats 666, 667, 668, 669, 670 and 671, constituted Group No. 5 and received dried whole wheat bread exclusively.

The experimental animals selected for the feeding tests were young and growing white rats of known antecedents from the animal colony of the nutrition laboratory. They were confined in individual cages of the screen and pan type provided with food and water cups. Their only source of food was the experimental diets and a constant supply of clean and fresh drinking water.

As it was considered of interest to observe the total food intake of the animals during the feeding period, a practical procedure was devised for this purpose which while not entirely free from objections gave results which approximate the total food consumed.

The diets were placed in small friction top cans, designated with a distinctive mark on the side of the can and cover. The total weight of can and contents was then noted. The diet from the weighed can was then transferred to the feeding cup with a small spoon, placing a sheet of smooth paper beneath the cup so that any accidentally spilled diet could be at once returned to the cup.

The cages were changed twice during each week, and any scattered food found on the floor of the cage was collected and returned to the can. When the contents of the can was exhausted, the can was weighed, and the difference in weight between the filled and empty can was taken as the approximate weight of the food consumed in the period of time required to exhaust the contents of the can.

TABLE III

Food Intake in Terms of Calories

| Animal No. Sex | Diet | Total Calories "Basic" or "Complete" | Diet Total Calories Bread | Total Calories Combined |
|---|---|---|---|---|
| | 10% Bread<br>90% Basic Diet | | | |
| 636-m | " | 6130 | 681 | 6811 |
| 637-f | " | 5047 | 562 | 5609 |
| 638-m | " | 5462 | 605 | 6067 |
| 639-f | " | 5140 | 569 | 5709 |
| 640-m | " | 5519 | 616 | 6135 |
| 641-f | " | 5324 | 591 | 5915 |
| | 25% Bread<br>75% Basic Diet | | | |
| 642-m | " | 5586 | 1865 | 7451 |
| 643-f | " | 4622 | 1545 | 6167 |
| 644-m | " | 5535 | 1848 | 7383 |
| 645-f | " | 4631 | 1549 | 6180 |
| 646-m | " | 5257 | 1754 | 7011 |
| 647-f | " | 4757 | 1588 | 6345 |
| | 50% Bread<br>50% Basic Diet | | | |
| 648-m | " | 3505 | 3509 | 7014 |
| 649-f | " | 2960 | 2961 | 5922 |
| 650-m | " | 3314 | 3316 | 6630 |
| 651-f | " | 2991 | 2996 | 5987 |
| 652-m | " | 3347 | 3349 | 6696 |
| 653-f | " | 2834 | 2836 | 5670 |
| | 75% Bread<br>25% Basic Diet | | | |
| 654-m | " | 1365 | 4092 | 5457 |
| 655-f | " | 1400 | 4197 | 5597 |
| 656-m | " | 1510 | 4531 | 6042 |
| 657-f | " | 1190 | 3572 | 4763 |
| 658-m | " | 1516 | 4546 | 6062 |
| 659-f | " | 1275 | 3825 | 5100 |
| | Whole Wheat Bread | | | |
| 666-m | " | | | 1200 |
| 667-f | " | | | 2190 |
| 668-m | " | | | 2112 |
| 669-f | " | | | 2112 |
| 670-m | " | | | 1365 |
| 671-f | " | | | 3277 |

The total food intake in grams of each group of animals for the feeding period of

142 days, as obtained by the above procedure, and the amounts of protein, nitrogen free extract, fat and ash present in the diets as calculated from the analytical data of Table I will be found in Table II. The total food intake in terms of calories is reported in Table III.

The graphs of Chart I show the growth of three groups of animals on the diets containing 10%, 25% and 50% respectively of the total calories as whole wheat bread, and the graphs of Chart II the growth with 75% of the total calories as whole wheat bread, and whole wheat bread exclusively.

### *Conclusions*

The growth of the animals on diets containing whole wheat bread do not suggest the conclusion that this type of bread has a more favorable effect on growth when compared with that previously observed with various amounts of milk bread under similar conditions.

Inferences that whole wheat bread should constitute a larger proportion of the bread quota of the diet than milk bread are not supported by these observations.

REFERENCES

(1) Baking Technology, February 1925, p. 49.

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## *Fashions in Eating*

"It is my deep conviction that most diseases that cause suffering after the meridian of life are passed are due to avoidable errors in diet" writes Clarence W. Lieb in HYGIEA for September. The statement is a truism heard at every dinner-table where middle aged folk gather. But the writer is not content to press home the idea that over-eating is the only thing to be avoided and goes on to stress the necessity of avoiding food fads and the dangers of jumping at physiologic conclusions.

"There are fashions in eating," he says, "as well as in playing, worshiping and loving, but the pendulum of fashion always swings too far. The diet with a large residuum is now rather generally advocated. The subject has not been viewed from the biologic and physiologic standpoint. The intestinal tract of civilized man is today shorter than that of the uncivilized man. This is due to the fact that for generations the former has been eating refined and cooked foods. Nature discovered that less digestive and absorptive surface was necessary on such a diet and to avoid redundancy in the alimentary tract it was gradually shortened. This is an evidence of anatomic economy. Doubtless there have resulted physiologic accommodations to civilized man's diet and possibly an increase in certain digestive juices and a decrease in others. Therefore a large proportion of our constipated bipeds and food faddists who are consuming inordinate amounts of cellulose are not only suffering from malnutrition and peristaltic fatigue, but are laying the foundation for a career of gastro-intestinal invalidism. The irritant effect of cellulose on sensitive, congested or ulcerated mucous membrane has potentiality for tremendous harm.

"Injury to the intestinal lining may be produced in two ways. First, if the concentration of the irritant poisons elaborated in the colon is great, they may, by chemical injury, so change the absorptive power of the cell as to permit the entrance of both toxins and bacteria into the system. The second way is that of mechanical injury to the cell membrane of the intestine by hard, dry feces or food high in coarse residue, thus permitting the absorption of bacteria or their toxic products.

"Many stomach derangements can be cured or avoided by living on a light diet that does not require much energy to digest or much digestive effort to assimilate."

# The Cooling of Bread

By I. A. Berg

*American Institute of Baking*

## PART III

It was shown in Part II of this investigation that the cooling of bread under the shop conditions noted, required an undue expenditure of time and was attended by appreciable losses in weight of the loaf.

The following experiments were undertaken for the purpose of obtaining data on the effect of cooling bread under controlled atmospheric conditions. The apparatus used as a cooling chamber was a double walled wooden box, well packed with two inches of granulated cork as the insulating material. The capacity of the cooling chamber was ten cubic feet. It was also equipped with water and brine coils for the regulation of the temperature.

The cooling chamber was fitted with a Brown recording hygrometer. One pan of a beam balance was suspended by a cord through a hole in the top of the chamber, so that a loaf of bread could be weighed during cooling. The cooling chamber was also fitted with a long stemmed mercury thermometer which could be introduced into the center of a loaf of bread.

### *The Experimental Procedure*

The experimental procedure was simple and consisted in removing a strap of five pans of bread from the discharge end of the traveling oven and immediately placing four loaves in the cooling chamber. The thermometer was inserted in the center of one loaf, another loaf was placed on the balance pan and the two others were placed so as to give an equal distribution of heat in the compartment. Readings of temperature and weight were made as soon as possible. The time from the oven to the first reading was usually 2 to 3 minutes. Readings of temperature and weight were made at five minute intervals for two hours. The recording hygrometer gave a complete record of humidity and temperature conditions in the chamber throughout the cooling period. Before starting the test the recording hygrometer was checked against a Lloyd hygrodeik which in turn had been checked against a standard psychrometer of the U. S. Weather Bureau.

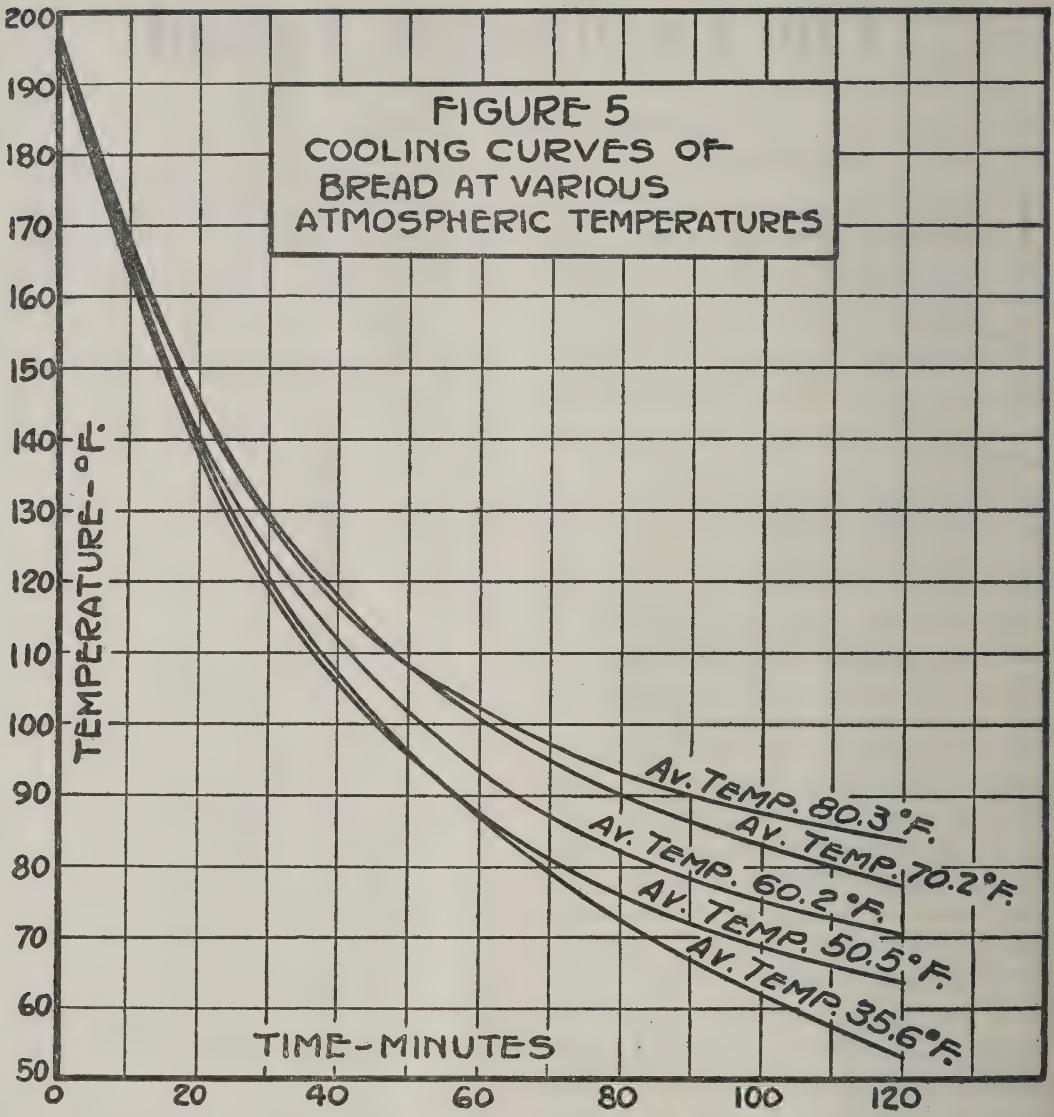
TABLE 5

**Cooling of Bread at Various Temperatures**

| Av. Cooling Temp. ° F. | 80.3 | 70.2 | 60.2 | 50.5 | 35.6 |
|---|---|---|---|---|---|
| Time | Internal Temperatures—° F. | | | | |
| 0 ....... | 195.2 | 197.4 | 202 | 193.8 | 194.7 |
| 5 ....... | 179.5 | 182.7 | 183 | 176.7 | 179.5 |
| 10 ....... | 163.9 | 167.9 | 166 | 161.8 | 163.8 |
| 15 ....... | 152.4 | 156.0 | 152 | 148 | 149.9 |
| 20 ....... | 143.0 | 145.8 | 142 | 136.3 | 139.3 |
| 25 ....... | 135 | 136.9 | 133 | 127.1 | 129.9 |
| 30 ....... | 128.2 | 129.0 | 124 | 119.5 | 121.3 |
| 35 ....... | 122.9 | 123.3 | 118 | 112.1 | 113.7 |
| 40 ....... | 117.7 | 117.7 | 111 | 106 | 107.2 |
| 45 ....... | 111.5 | 112.6 | 105 | 101.5 | 101.0 |
| 50 ....... | 108.1 | 108.0 | 102 | 96.1 | 96.0 |
| 55 ....... | 104.5 | 104.7 | 97 | 91.9 | 91.4 |
| 60 ....... | 102.5 | 100.9 | 93 | 88.1 | 86.7 |
| 65 ....... | 100.0 | 97.5 | 90 | 84.5 | .... |
| 70 ....... | 97.5 | 95.4 | ... | 81.7 | 79.3 |
| 75 ....... | 95.1 | 92.5 | 84 | 78.7 | 76.4 |
| 80 ....... | 93.0 | 90.1 | ... | 76.3 | 72.4 |
| 85 ....... | 90.7 | 88.0 | 80 | 74.3 | 69.4 |
| 90 ....... | 89.1 | 85.8 | ... | 72.4 | 66.9 |
| 95 ....... | 87.9 | 84.2 | 76 | 70.5 | 64.3 |
| 100 ....... | 86.9 | 82.5 | ... | 68.8 | 61.8 |
| 105 ....... | 85.7 | 81.5 | 73 | 67.0 | 59.2 |
| 110 ....... | 84.8 | 79.7 | ... | 65.9 | 57.6 |
| 115 ....... | 83.9 | 78.4 | ... | 64.8 | 55.4 |
| 120 ....... | 83.4 | 77.4 | 70 | 63.5 | 53.3 |

Table 5 presents the data from two or more tests showing the cooling of bread at the various average temperatures. This data is shown graphically in Figure 5.

The curves are fairly consistent with the average surrounding temperatures.



According to these experimental results a temperature of 95° F. inside the loaf is reached in 51 minutes at temperatures of 35° F. and 50° F., 58 minutes at a temperature of 60° F., 70 minutes at a temperature of 70° F. and 75 minutes at a temperature of 80° F.

The loss of moisture during cooling seems to be influenced by several conditions, such as the degree of baking and consistency of the dough. Underbaked loaves lost more moisture during cooling than well baked loaves. Bread made from slack doughs was observed to lose more moisture during cooling than the bread made from stiffer doughs. Characteristics of the loaves, size and shape are also of significance in relation to loss of moisture.

The chamber used for cooling the bread was not designed to include humidity control apparatus because of the obvious difficulties of satisfactory operation. The humidity of the chamber was recorded, as previously noted, and since temperature caused variations in humidity, the effect of these changes could readily be studied.

### *Low Temperatures Save Time and Weight*

The averages of two to four observations of similar atmospheric conditions are presented in Table 6 and shown graphically in Figure 6. The curves indicate that the temperature of the air has a greater effect on preventing evaporation in the first few minutes of cooling than the per cent relative humidity. In the latter stages of cooling the per cent relative humidity is of more importance as is well illustrated by comparing the rise of the three curves. Reference to Figure 5 shows that the time required for proper cooling of bread in temperatures of 50° F., 70° F. and 80° F. are 51, 70 and 75 minutes respectively. This demonstrates the advantages of low temperature in preventing evaporation and also in economy of time. A further study of Figure 6, curve 1, brings out the fact that in 51 minutes the

TABLE 6
Evaporation Losses During Cooling in Experimental Cooler

| Aver. Temperature ° F. | 81.7 | 72.4 | 50.2 |
|---|---|---|---|
| Average Humidity %... | 74.5 | 88.0 | 94.1 |
| Time Mins. | Per Cent Loss | | |
| 0 | 0 | 0 | 0 |
| 5 | .44 | .49 | .381 |
| 10 | .71 | .70 | .575 |
| 15 | .934 | .922 | .728 |
| 20 | 1.07 | 1.075 | .852 |
| 25 | 1.19 | 1.19 | .999 |
| 30 | 1.29 | 1.25 | ..... |
| 35 | 1.37 | .... | 1.083 |
| 40 | 1.42 | 1.38 | 1.123 |
| 45 | 1.48 | 1.42 | 1.16 |
| 50 | 1.53 | 1.475 | 1.18 |
| 55 | 1.56 | 1.495 | 1.205 |
| 60 | 1.60 | 1.532 | 1.218 |
| 65 | 1.64 | 1.552 | 1.235 |
| 70 | 1.68 | 1.582 | 1.245 |
| 75 | 1.70 | 1.597 | 1.255 |
| 80 | 1.73 | 1.612 | 1.262 |
| 85 | 1.76 | 1.625 | 1.262 |
| 90 | 1.79 | 1.635 | 1.262 |

Table 6 contined on next page

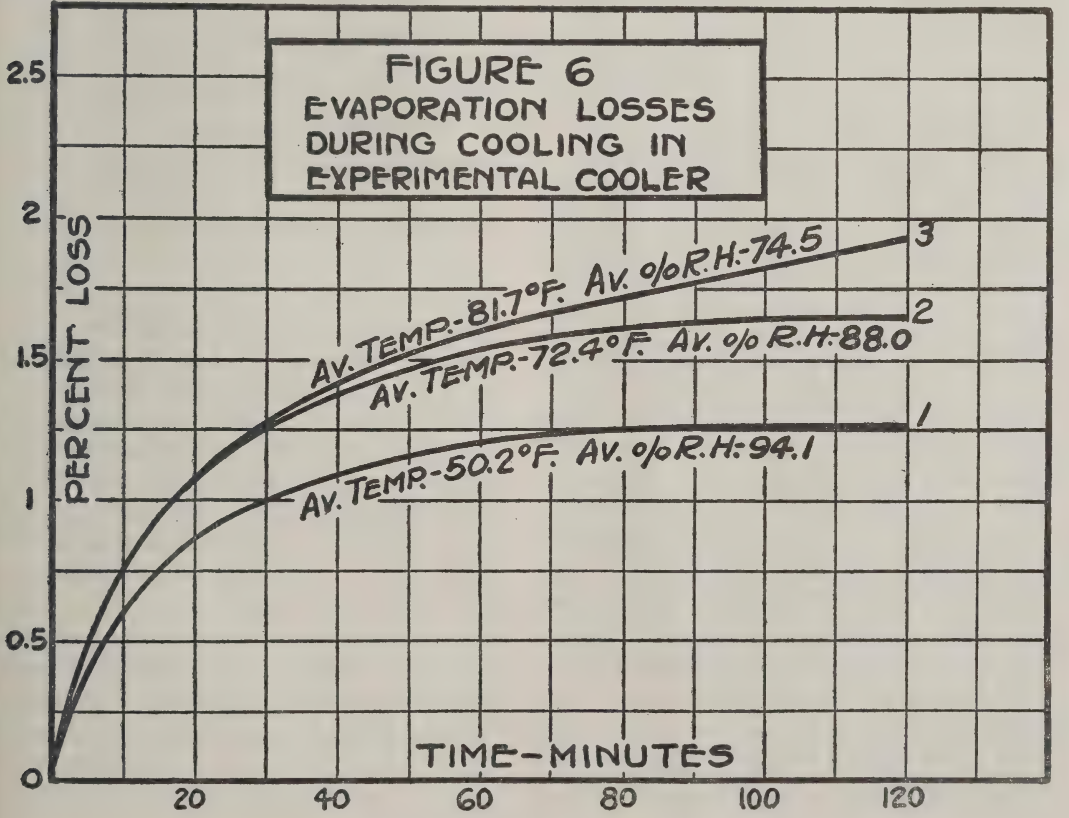


Table 6 concluded from preceding page

| | | | |
|---|---|---|---|
| 95 | 1.82 | 1.645 | 1.262 |
| 100 | 1.84 | 1.66 | 1.266 |
| 105 | 1.86 | 1.66 | 1.266 |
| 110 | 1.89 | 1.665 | 1.270 |
| 115 | 1.91 | 1.67 | 1.263 |
| 120 | 1.93 | 1.67 | 1.266 |

loaf is still losing moisture. If it is wrapped at this time a saving would be effected. It is also seen that where low temperature cooling is used the per cent relative humidity appears to be a minor factor. Naturally it becomes high due to the low temperature of the atmosphere and because of the moisture which evaporates from the bread. The latter condition cannot be prevented.

It was observed that after cooling in low temperature atmosphere the bread did not appear at all soggy. It was also noted that after 24 to 36 hours' wrapping, bread cooled in the cooler possessed a better flavor, a somewhat better character of crust and appeared fresher than bread cooled on a rack. (To be continued)

## *Wrong Eating is Deadly*

DR. ROYAL S. COPELAND, in the Chicago Herald-Examiner for July 27, calls attention to the fact that wrong eating is the chief cause of illness and death. He makes the rather startling statement that if one should go through a cemetery and mark the graves of those whose deaths were caused by wrong eating, there would be found scarcely a family that would not have at least one such mark. "Summertime," says Dr. Copeland, "is particularly trying, with less need for the heat-producing foods that are set before you every day." They are all tempting and the point the writer emphasizes is that while no one of them, eaten in moderation, is injurious, the danger lies in overeating.

A house may be fine, but without bread it is miserable. —Old Russian Proverb.

## *Bread and Gravy*

Life has lots of fancy things,
Yes, fancy things at fancy prices.
The platter that the waiter brings
Is heaped with jellies, sweets and spices.
And yet I never had a treat,
A pie with borders crimped and wavy,
Or anything as good to eat
As good old-fashioned bread and gravy.

Of course it's wrong to sop around
Your bread, you're not supposed to do it.
But if there's gravy to be found
And good white bread, then lead me to it.
For anyway it's often done
In both the army and the navy—
I tell you, many a war was won
For Uncle Sam on bread and gravy.

We think we want a lot of wealth,
But find we need almighty little.
A fellow has the most of health
Who eats some ordinary victual.
The lady with no appetite
Might envy any kitchen slavey
Who sits her down to dine tonight
On plain and simple bread and gravy.

And so it is in lots of ways:
We do not need the fancy dishes.
Some work to do, some kids to raise,
Are what the wiser fellow wishes.
A few glad hours, a few good friends
Who call you Dick or Dan or Davey—
Happy the man whom heaven sends
A life that's mostly bread and gravy.

—From "Lyrics of Life,"
by Douglas Malloch.

"As reader of Bakers Weekly, I should be much obliged to you if you would kindly send me your new booklet entitled: "Baking Science and Human Welfare."

M. Fauser,
Jerusalem, Palestine.

## Apple Pie Wins

IT is one of the ironies of life that people and things that need the least publicity get the most. Take apple pie, for instance. Members of the Ohio Restaurant association, meeting in Cleveland, have balloted on America's most popular dish. Apple pie wins, of course.

Now, if this pomaceous pastry, masterpiece of the culinary art, needed this boost, that would be one thing. But when one is told that a sunset over Naples bay is beautiful or that Indiana summers are delightful, one is not much impressed because one knew it all the time. So with apple pie; it is one of the corner stones of democracy. The constitution may fall and the union be rendered, but as long as apples are grown and cooks are able to roll out crusts, the pie of the people will stand a delectation and a symbol.

We hope these restaurant overlords will carry the matter further. In a broad sense apple pie is apple pie, but there are degrees even of perfection. We should like here to register a protest, long incubating, against the too prevalent custom in quantity production circles of putting the core as well as the flesh of the apple into the pie. It is worse than a fly in the ointment.

On an average the American at middle life has consumed something like 7,638 pieces of pie, 6,529 of which were applied segments. He is by this time an expert on pie and knows what he wants and how. When Vice President Marshall said the country needed above everything else a good 5-cent cigar, he forgot his bringing up in rural Indiana. He overlooked apple pie and the injury done free thought when its helpings went to a dime.

There are few justifications for the return of the ducking stool, but the putting of glucose filler into fruit pies is one.

—Terre Haute Tribune.

## Time Still Moves On

"WOMEN can cut out wrinkles, but they cannot cut out the cause," says Dr. William Bayard Long. "They can have their faces 'lifted,' but they cannot stop the sun from rising. Time moves on, whether women are reconciled to growing old gracefully or not. And sooner or later another wrinkle will appear."

Dr. Long has observed the results of many methods that present day women are using in their hopeless attempt to defy age. One of the most common is "reducing." And many women are just learning to their regret that in proportion to their success in removing flesh from their bodies their faces begin to sag and look haggard.

### *Fair If Fat*

Says Dr. Long:—"I have repeatedly seen women who have undergone diets and treatments for reduction until they attained the beautiful, slender figure of a girl of sixteen. But their faces had become so drawn meanwhile as to add at least ten years' age to their appearance.

"The only remedy for this—and it is seldom entirely successful—is to resume a fattening diet and try to restore the plumpness that has been lost. One of the puzzles to which doctors have not yet worked out an answer is why drastic weight reduction often seems to affect first, and most severely, the flesh of the face. Yet many women who have longed for the 'boyish form,' and have been willing to deprive themselves of eating, almost to the point of starvation, have discovered that with its attainment has come the loss of all their facial beauty and attractiveness. Their very plumpness — which they had despised—had been their source of beauty."

—N. Y. Telegram.

## *Mining Our Farm Soil*

WE ARE not farming; we are mining our soil. This is the obviously true statement of the National Industrial Conference Board. The board has just issued a report comparing other countries' profitable methods of farming with our reckless method of scraping off the richness of the soil, robbing it of its strength so that it progressively gives smaller and smaller returns.

The comparison is striking. Holland, Denmark, Belgium, England, and Germany, each of which uses more liberal amounts of fertilizer than we do, are the countries with which the board compares the United States in the following wheat table:

| | Wheat per acre (bushels) | Fertilizer used (pounds) |
|---|---|---|
| United States | 13.9 | 5.1 |
| Holland | 41.1 | 168.4 |
| Denmark | 39.0 | 14.6 |
| Belgium | 35.4 | 30.4 |
| England | 31.2 | 19.0 |
| Germany | 20.5 | 65.0 |

England's soil probably never was as good as our best. In addition, the English soil has been farmed for much more than a thousand years, and for centuries it has been farmed intensively. Yet England produces nearly two and one-half times as much wheat on each acre devoted to that crop as we do. The main reason is that England uses nearly four times as much fertilizer.

### *Virgin Lands Gave Good Yields*

The board reports that there was an increasing acre yield on American farms up to 1900, but that since then there has been an increasing decline in the yield per acre. The increasing yield before the beginning of this century was not because we were giving proper care to the soil. For we were not giving such care. The increasing yield before 1900 was due partly to our increasing use of mechanical aids and partly to the fact that we were constantly opening up virgin lands. We left New England for Illinois, for Iowa, for Wisconsin. And later Illinoisans would leave for Kansas. And still later Kansans would leave for Nebraska or the Dakotas.

But by 1900 we had about exhausted the possibilities of this procedure. On the whole, we are now farming the same land we farmed in 1900. We have additionally increased our use of machinery on the farm, but that addition has not been sufficient to offset our constant robbery of the strength of the soil. Consequently the yield per acre has continually decreased.

### *Well Fertilized Soil Pays*

The National Industrial Conference Board also points out that the average bushel of wheat now being produced in the United States contains minerals and plant food absorbed from the soil valued at about 6¼ cents, and the average bushel of corn or oats contains similar wealth worth about 2½ cents. If a bushel of wheat takes 6¼ cents of food value from the soil, it is obviously worth while for the farmer to put 6¼ cents of fertilizer into the soil and eventually get another bushel for it.

It does not cost much more to plow, cultivate, and harvest an acre of wheat producing less than fourteen bushels, as in the United States, than it costs to perform the same tasks on an acre producing more than thirty-one bushels, as in England. The gain resulting from the use of fertilizer is almost entirely net profit.

—Chicago Journal of Commerce.

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Want of bread will divide the whole family; it is bread that is the real uniter.

—Indian Proverb.

## *Relative Luncheon Values*

UNDER the title "Lunch" Winifred Stuart Gibbs in a recent number of the New York Telegram discusses the classification and comments made by a certain "sprightly publication" on various groups of individuals in selecting a lunch. As arbitrarily classed by this publication the $10 a week group "purchases fruit from push carts, milk in little bottles, and carries sandwiches from home." The $20 a week group indulges in chocolate sodas with chocolate eclairs; the $40 a week group "go to a more pretentious confectionery shop, sit at microscopic tables, and order hot chocolate with whipped cream, fudge shortcake with whipped cream, and corned beef hash with whipped cream." The last group, the $4,000 a week, goes to a chain restaurant and selects graham crackers and milk.

In commenting on these types of lunches, Miss Gibbs believes that the $10 a week group chooses most wisely. To be sure, the fruit may be covered with undesirable dust, but there is always a convenient water tap, and the milk if of good quality, and not in dirty bottles, is the best beverage we have. The homemade sandwich if properly prepared, forms a good basis. Taken altogether, this lunch is very satisfactory. Going to the other extreme, the lunch chosen by the $4,000 a week group no doubt meets the requirements, for the lacking fruit and vegetables will be found later on the dining table. It is the groups between these two that need to readjust their selections, for while the chocolate sodas and chocolate eclairs of the $20 a week group are rich energy foods, they furnish little muscle building material. The same is true of the $40 a week group, excepting of course the "corned beef hash with whipped cream."

"The moral is obvious," says the writer, "it is those who are in between these two groups that need the education."

## *Dr. Brady Appraises Bran Bread*

"Is bran bread as fattening as white bread?" inquires an anxious over stout who appeals to Dr. William Brady's Personal Health Service. "I have been eating it several months instead of white bread but I do not reduce any." The answer is "There is practically no difference. It is futile to try to get thin by eating something. To reduce you must stop eating something or eat less of it."

## *Butter Pound Cake*

WHAT is a butter pound cake and when can a baker call his cakes by that attractive name? A Philadelphia baker has recently made an expensive investigation of the subject and his findings are related in the February issue of the News Bulletin of the Pennsylvania Pure Food Department. It appears that an inspector of the department found a butter pound cake on sale which on analysis contained no butter and so justified the prosecution of the baker for violation of the pure food law. The baker contended that the name "butter pound cake" was merely a trade-mark but his defense was overruled by the court.

This incident is but another example of the old practice of misbranding which in spite of the general observation of every section of the food laws still rises now and then to penalize not only the guilty person but his whole industry. Honest labels backed by honest products will establish confidence. Butter pound cake means made with butter just as clearly as milk bread means a bread made with milk.

For bread do men learn science and art,
That house is full of sorrow where is no bread.

—Indian Proverb.

# Books for the Baking Laboratory

CHEMISTRY IN AGRICULTURE. A co-operative work intended to give examples of the contributions made to agriculture by chemistry. Edited by Joseph S. Chamberlain. Advisory Editor, C. A. Browne. The Chemical Foundation, N. Y. 1926, 384 pp.

The title of this interesting and popularly written book is well chosen. In recent years the province of agricultural chemistry has utilized the assistance of most of the departments of chemical science with their special methods of technique and theory.

A generation or more ago before the science of chemistry had become as specialized as it is today, the worker in agricultural chemistry had little difficulty in keeping abreast with the available knowledge of his subject. He was, in most cases an all 'round chemist who worked in the laboratory, and further, a well informed scientist of wide interests and vision. Today there are no more general agricultural chemists, and the field has been allotted to various specialists trained in the newer methods and conceptions of contemporary chemistry and the borderland sciences.

The sixteen chapters of "Chemistry in Agriculture" have been prepared by special authorities, many of whom are, or have been, connected with the agricultural experiment stations in the capacity of an investigator.

Various well known workers in the chemistry of soils, crops, cereals, sugar, milk, and nutrition have contributed popularly written articles that are worth reading even by those who are commonly supposed to know something about these subjects.

The chapters on the cereals by C. H. Bailey of Minnesota; agriculture and the evolution of our diet by C. F. Langworthy, of Washington, U. S. Department of Agriculture; and vitamins in human and animal nutrition by R. H. Dutcher of Pennsylvania, should be of considerable interest to readers of Baking Technology. Prof. Langworthy's chapter is commendable, and contains important American historical references on the development of food study in this country which have been overlooked by some of the more pretentious writings on this subject.

The chapter on the chemistry of milk and its products by Dr. L. L. Van Slyke of the New York State Agricultural Experiment Station is also of importance to any one who wants to read an informative discussion of this subject.

"Chemistry in Agriculture" has decided merits in comparison with most of the literary material that is published under the guise of popular science and it ought to find a place on the library table of the intelligent reader, in the chemists' library, and as supplementary reading for secondary schools and colleges. The book is well illustrated and contains several reproductions of photographs of the older American chemists, Johnson, Atwater, Armsby and others, whose services to the chemistry and agriculture of this country are of interest to every student. C. B. Morison.

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BIBLIOGRAPHY OF BIBLIOGRAPHIES ON CHEMISTRY AND CHEMICAL TECHNOLOGY, 1900-1924, 308 pp. Compiled for Research Information Service by Clarence J. West and D. D. Berolzheimer. Published by the National Research Council of the National Academy of Sciences, Washington, 1925.

An important bibliography, which is the third of a series of collective scientific bibliographies prepared by the Research Information Service of the National Research Council. The first two publications were on geology and physics, and the third like its predecessors maintains a high standard of excellence. Chemists, technical librarians and others should add this important volume to their library. C. B. M.

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## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Something new in connection with the baking industry.** Otto Czadek, Oesterr. Chem. Ztg. 29, 83-4 (1926).—A discussion of the recovery of alcohol from the fermentation process in the making of bread. Only large size bakeries can do it with profit; a plant with a capacity of 100,000 kilograms flour recovers 1,000 liter alcohol. C. discusses further some new patented chemical methods to improve the quality of flour, as well as the bleaching process. The last named ones are not favored, as they only tend to cover up the poor quality of the flour.

J. C. Jurrjens.

**Alcohol recovered from the baking of bread.** Lindet. Compt. rend. agr. France 12, 158-60 (1926).—About 5 liter of alcohol are produced per 1,000 kilograms of bread.

F. M. S.

**Changes in flour during storage.** J. E. Greaves. American Miller, 54, 376 (1926).—At the Utah Experiment Station there were stored 13 50-lb. sacks of flour from December, 1921, to January, 1925. Baking tests and yearly analyses of the flours were made. The flours, milled from wheats of different varieties grown on both dry and irrigated lands, ranged from the highest patent to whole-wheat. The results indicate that it is only inferior flours which greatly increase in acidity during four years' storage. There is a variation in the water-soluble reducing sugars found in different flours, and there is a tendency for the water-soluble carbohydrates to increase during storage. The water absorption power of these flours increased considerably. Some of the flours yielded a loaf of greater volume after storage, whereas others registered a shrinkage. The results as a whole point to the conclusion that the flours improve in breadmaking properties on storage and that this benefit comes from ripening changes brought about by the action of enzymes on the carbohydrates, fats and proteins.

L. H. Bailey.

**Diet in relation to reproduction and rearing of young. I. Observations on the existence of vitamin E.** V. E. Nelson, R. L. Jones, V. G. Heller, T. B. Parks and E. I. Fulmer. Am. J. Physiol. 76, 325-38 (1926).—Reproduction and the rearing of young were possible in white rats on a diet of casein 18%, salts 3.7%, butter fat 5%, yeast 3 to 12%, dextrin to make up to 100%. The authors believe that the sterility noted in animals on synthetic diets is not due to a lack of fat-soluble vitamins; but may be due to an insufficiency of vitamin B and an inadequate quantitative relation between the known constituents of the diet. II. A. E. Guest, V. E. Nelson, and E. I. Fulmer. Ibid 339-48.—Diets consisting of casein 18%, salts 3.7%, butter fat 5%, different seeds 10-60% and dextrin up to 100% gave successful reproduction in white rats when 10% of wheat supplied all the vitamin B of the diet. Young were reared when wheat made up 15% of the ration. Reproduction was obtained on amounts of vitamin B barely sufficient for normal growth, but normal lactation and the rearing of young seem to demand much larger amounts of vitamin B than is necessary for growth. White and yellow corn are not as rich in vitamin B as are wheat, rye and barley.

J. F. Lyman.
L. H. Bailey.

**Notes on gluten.** B. D'Arbouet. Rev. gen. colloides 4, 97-107 (1926).—Gluten absorbs not only water but all the compounds dissolved in it, e. g., diastase. The fermentation is caused by these absorbed materials. The two important factors in bread-making are the quantity of proteins present and the pH of the medium. The former is predetermined by the constitution of the endosperm in the seeds. The best pH is 5, which is the isoelectric point of gluten. "Round" flour, which has the appearance of fine sand, forms a more coherent gel and is therefore superior to "flat" flour, which is more like an amorphous powder. This weakness of the flour is caused either by poor milling or by the unbalanced protein content of the seeds. If rye flour, which has a different protein ratio, is added to wheat flour, the network of the gel structure formed by the proteins is weakened and the development of the dough is retarded. The amount of proteins can be regulated by the addition of bean flour; the pH by the addition of acids, phosphates or sulfates to the water or the dough.

J. A. Szilard.

**A rapid method for the colorimetric determination of hydrogen-ion concentration of crackers.** R. T. Bohn and R. J. Martz. Cereal Chemistry 3, 183 (1926).—The LaMotte Hydrogen-ion comparator set containing standard colors was used in the colorimetric work. Crackers were ground in a mortar to a fine meal and 10 grams of this meal were digested with 100 cc. of distilled water at room temperature for 5-10 minutes, the suspension was filtered on cheesecloth, and the pH of the filtrate determined with an alcohol solution of phenol red as the indicator. The pH was also determined electrometrically and the results were in close agreement. A more rapid colorimetric method was developed. It consists of placing several drops of distilled water across the freshly broken surface of a cracker, then several drops of a water or alcohol solution of phenol red and comparing the color that results with standard colors. For pH above the range of phenol red, it is suggested that cresol red be substituted in preference to thymol blue. The rapid method yields results that check closely to those obtained by the regular methods described when the values are near 6.9 but vary more when they are above 7.2. Most crackers are alkaline. In the hands of an unskilled operator, the pH can be easily determined to within 0.2.

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UNIVERSITY OF ILLINOIS

# The Dry Bones of Diet

By Winifred Stuart Gibbs*
*Food Specialist*

WHY not stop rattling the dry bones of food facts in the tired ears of those who need advice in regard to improving their nutrition?

It would require a very sunny disposition to react with genuine enthusiasm to the statement that "2,100 calories are needed to give sufficient energy for one of your sex, age and occupation."

On the other hand, say to that woman (the 2,100 tells us that it is a woman):—"You play an awfully good game of tennis! Pity that you are not entering for the singles in the tournament!" and watch her eyes flash.

Or supposing one is talking to a child who is sensitively alive to the fact that he is behind his chums in his standing at school. Try some such entering wedge as this:—"Jim is a good scout and you can easily catch up with him; all you need is a little more pep, and there's nothing like milk and orange juice and spinach to put pep into a chap."

### *Dust Dry Facts Uninteresting*

In other words, some of us have perhaps been a bit too insistent on stressing the dry as dust and technical details of diet. What we should be doing is to steep ourselves first of all in a knowledge of the special interests of those whom we are striving to help.

Accustomed as we are to the dwelling on technicalities, we shall probably have to begin our training at home! Self training comes first here, as in so many other of life's activities. A little practice in visualizing the aims for which we are working will do wonders. We shall find our minds teeming with pictures of happy school children, romping joyously on hockey field or tennis court, or triumphing easily over the intricacies of "math." There will be visions equally definite of successful business men and women, of well poised and spiritually satisfied home makers, as well as of leaders who help to make the wheels of the world's machinery "go round."

### *Inspiration for Health*

By such pictures as these it is easy to relate the facts about food values to the question of the energy needed to help Jack win the tennis match. That mother's ambition to shine as a social success is laudable we have long believed, but when we realize that complete nutrition will go a long way toward giving her the poise so necessary to social success, what more natural than our newly intensified interest in the study of dietetics.

### *The Craze for Diet Facts*

In our zeal to do a good job of whatever presents itself at the moment it is fatally easy to slip into the way of being over-academic about this present day craze for information about diet.

If we are, perhaps, more or less alone and must depend on our own enterprise for the acquiring of the needed information as to how best to "reduce," or as to the proper diet for that troublesome ailment, then the situation calls for application of this same principle. Let us think primarily of what we wish most to accomplish when our diet has been revised. Ten chances to one the dry bones of dietetics will be changed into freshly blooming flowers of knowledge.

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* As printed in the New York Telegram.

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# The New Competition

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THE tides have ebbed and flowed on the sands where Atlantic City serves as the nation's playground for countless years. Their force and energy is utterly wasted. When American Bakers Association held its annual convention within the sound of the rolling surf the third week of September, the broad ocean lay smooth and placid in the sunlight. It bore not the slightest evidence that a few days before it rolled its tidal waves over thousands of homes along the Florida coast.

President Schumaker used this theme in developing the subject of his annual address. He showed that evolution in the business world is as ruthless as are the elements of nature. It is true that the hand of man can harness the forces of nature and apparently control the elements, but it only takes a tidal wave, a volcanic eruption or an earthquake to show how futile would be an effort of man to attempt to control permanently nature's efforts.

There are men who believe that competition in business is a thing that can be avoided and that there should not only be like opportunity for all but that all businesses should be conducted under similar conditions, but the marked development of American business, unparalleled in the history of the world, has been under competitive conditions, and today organized society demands that there be competition between business men for it has learned that this competition stimulates greater effort, keener thought and produces better goods for less money, and this competition which society demands is ruthless as nature, sparing no one that stands in its way.

This competition may be between men in the same line of business, or it may be between industries themselves.

For example, competition between the manufacturers of buggy whips and automobile accelerators was of short duration. The buggy whip is now almost forgotten.

Competition between lumber manufacturers became so keen that they were forced to get together in a strong trade association to save themselves, and at the same time the competition of other building materials, such as brick, steel, stone, tile, concrete, metal lath, composition flooring and scores of other materials to take the place of wood, helped them into a defensive body. The National Association of Lumbermen raised and spent last year nearly $1,000,000 for the benefit of the industry.

The coal operator today is anxiously looking at gas, oil and electricity, which slowly but steadily are fighting their way into homes and factories where coal was once king

The ice manufacturer, whose morning call—"Any ice today lady?" has become classic,—is now anxiously watching the development of the small refrigerating units which are being established in homes, apartments, hotels and stores.

Scores of old industries are losing ground today because of new inventions and discoveries, because of changing habits and customs. An essential, growing industry today may be a declining one tomorrow.

### *Why Trade Associations Exist*

There are over 2,500 trade associations in the United States today. The first trade associations were formed to correct some evil or abuse within the industry. As competition between industries became keener, trade associations were formed and became stronger for the protection of all members of the industry.

There are some 115 bakers' associations in the United States today and there is little or no co-operation beween them, though they all enjoy a friendly relationship.

Among the trade associations of the country, bakers' associations are the weakest in their influence and in their accomplishment, the chief reason being that bakers have not had enough serious competition among themselves, they have all considered their business an essential one and most bakers do not realize today that they are now on the defensive and that other foods are here and there replacing bakers' products. Many bakers do not know that in the four years following 1918, at a time when business interests and the public were trying to adjust themselves to the Eighteenth Amendment, the use of wheat flour decreased twelve per cent per capita and that it has since been slowly but less rapidly declining. I hear some bakers talk about competitors in their town or community who give away premiums, who cut prices below cost, who give discounts. I have yet to find a case where this condition could not be remedied, provided the bakers in that locality could be brought together in conference. Sometimes it took months and not always was it accomplished within a twelve months' period, but I have never seen failure where bakers could be brought together in the fellowship of an association membership. Sooner or later they could always find a way to remedy their troubles.

### *What of Our Competition?*

I have heard bakers say that in no other business is there the competition that exists in the baking business. Are we a fighting, disorganized crowd?

One Baker sells the home direct by house-to-house delivery.

One Baker sells the grocery store which for the convenience of its customers carries all bakers' products.

One Baker sells everything he makes over his own store counter and gives a personal service.

But all appeal to the same thing—"The Family Appetite." All cater to the same public.

The housewife's pocketbook pays us all. We are all working for our share in her budget.

What an opportunity to coordinate our efforts and sales appeals. Other industries have done it.

Let me cite one example—that of the paint manufacturers. Competition became so keen and trade practice so unfair that it was not unusual for a paint manufacturer to take his competitors' goods away from a dealer in exchange for an order for his (the first manufacturer's) paint. He would then sell his rival's paint in the open market at less than his rival's prices to the trade, often selling below actual cost of manufacture. Conditions got so bad that the paint manufacturers had to get together to save themselves. Today, through building a strong national association, the industry is in good shape. The "Save the Surface and You Save All" National Campaign enables each manufacturer to push his own brand and profit by the national advertising.

### *Time Means More Than Money*

Must conditions reach such a stage in the baking business before bakers will support bakers' associations, not only with their money but with their time? Have bakers enough brains to avoid such an unhappy situation? It can be done, the opportunity is here.

Our Secretary of Commerce has said—"If business will not, the Government will." Will what? Will make the Industry—serve the public to their satisfaction.

Competition in trade led to the formation of combinations and mergers in all of our essential industries—oil, steel, leather, sugar, etc. The baking business was one of the last to respond because it had never experienced serious competitive conditions, excepting in the cracker line, and this had been settled many years ago by the formation of one national company and later a second. And so, when finally during the past year various groups of bakers were brought together in mergers and combinations, not through the strain and grief of ruinous competition, but through bankers who saw in the baking business a stable and permanent business, which should afford safe investment; and because there were some whose ambitious planning looked forward to massed production of standardized products, there was great uneasiness in the baking industry. Some professed to see a great octopus that was going to envelop the whole industry and crush the small baker and appeals were made that something must be done to stop the progress of these mergers and combinations. Organized society looked on amused. Mayors of cities, governors of states and college professors, when called upon to address audiences of bakers, without exception told us that if these combinations and mergers could make better products, could manufacture in a more perfect way and could distribute more economically, then organized society wanted them. They represent a phase in the evolution of the baking industry. If they fail it will not be because any laws are passed to obstruct them or because the hand of their fellow-baker is turned against them. If they succeed, it will not be because they are well-financed and supported by rich and powerful interests, it will be only because they serve society better than it has been served before.

### *What Does the Association Offer?*

Every small or local baker has the same advantages the chain bakeries have, excepting quantity buying and experienced judgment. Baker Associations offer both.

There are many bakers who think that one of the duties of the Association is to establish better relationship between member bakers and correct all abuses in price or trade practice, where the methods of one baker injure another. This would be ideal, but an Association's authority in matters of this kind effecting individual members is limited. The Association does not have and cannot have the authority of an employer who can make plans with the knowledge that he has the authority to see that they are carried out. The officers of a trade association have no authority over the members and discussion of price is merely informative. The laws of our country are very strict in this respect. The Federal Trade Commission has been appointed for the purpose of considering and acting upon trade practices that are unfair and against the best interests of the community. They can always be called upon. The Association affords its members opportunity for meeting and for fellowship and they should take advantage of these opportunities to adjust their differences. It is neither the duty nor the right of the Association to do more than use its influence in trying to effect a better understanding and a discontinuance of objectionable trade practices.

## *Cheese—A Food of the Ancients*

"It is interesting to note how old cheese is. The early Greeks appeared to have been familiar with cheese long before they knew how to make butter. The Romans evidently copied from the Greeks the method of cheese-making, for they too are known to have had cheese in their dietary. It was known also to the early Egyptians and is mentioned in the Bible."

—Customs of Mankind—Eichler.

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A community completely alive to the possibilities of improving the nutrition of the citizens will not be satisfied to leave the discussion of these matters to professionals. The citizens will wish to take a hand. They will desire eagerly to learn of the educators, that they in turn may carry the message into other localities.

Selling nutrition is a job for every man and every woman!

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Specialty salesmen can give thousands of reasons why you should use premiums, but not one thought for the hurt and harm done to honorable bakers who are trying with intelligence and expense to bake an honest loaf that will be beneficial to the building of public health, and selling it on a quality and service basis.

If you are not using them, don't—for to fall from grace would be a sin in the eyes of well-thinking bakers who are trying to purge the industry of all unethical trade tricks.

Build your business on quality and service and advertise it intelligently in newspapers, street cars and bill boards,—ask the Trades Promotion Department of American Bakers Association—it knows how.

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A gift of bread to a good man is a loan, and an alms to others.

—Old Russian Proverb.

## *Feed Children After School*

WHEN some two years ago American Institute of Baking came to the rescue of hungry children condemned by the taboo on between meal feeding to go without bodily fuel through the long afternoon and suggested that it was essential that empty stomachs be filled to secure growth and sound health, many well intentioned people deplored the departure from the old custom of three meals a day. Some of them said that children who ate a sandwich after school would lose their appetite for dinner. Others tried to fit the explanation of obesity as a result of overeating among adults to the slender forms of immature children. But in spite of the old textbook notions that children should keep out of the pantry a remarkable and almost universal acceptance of the after school feeding plan has come about.

Teachers, physicians, dietitians and mothers have approved the plan. It has become an accepted routine in millions of homes.

One of the most interesting discussions of hungry children is printed in a recent number of the A. & P. News where Ann Page of the Home Service Department says:

"An eminent dietitian writing on child feeding heartily recommends the plan of preparing a light lunch for children returning from their session at school. This expert points out the strenuous hours of energy, and advises a light lunch to renew the vigor before letting the children go out for their afternoon of play.

"We know that children are active little bodies, always running, jumping, and skipping hours at a time. Good wholesome food is needed to build strength into each muscle and bone.

"Why not adopt the plan of preparing a light lunch for the children to eat at three-thirty in the afternoon."

## *Sandwiches for English Appetites*

THE sandwich habit which has been firmly fixed in the appetite appeal of millions of Americans has caused British bakers to wonder if it cannot be cultivated over there as a practical way in which to bring hope for future prosperity to those who are now worrying over the declining consumption of bread. In a recent article Alexander Dunn, writing in The British Baker says, "The development of the sandwich habit in America has been astounding. The downtown streets of American cities are now as closely thronged with sandwich shops as are the streets of many English cities with public houses. In both cases it seems impossible that there could be sufficient trade to warrant the large number of establishments. When it is estimated that in a city the size of Buffalo, N. Y., which has a population of little over half a million, there are consumed every day about a quarter million sandwiches, it may be understood that the need for sandwich shops in American cities is great.

"The sandwich tendency only began to develop in the United States about three years ago, and what brought about its great popularity is a question upon which retailers greatly differ. Some say that the advocacy of the light lunch by medical men has wrought the shift, while others are of the opinion that the present choice of sandwiches is so wide that there is one to please the taste or satisfy the appetite of everyone. Whatever the cause, the bread bakers of the United States have something to be very thankful for, as their business has been enormously increased without the expenditure of one ounce of energy or one penny of money upon their part."

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Bread in the street, justice in the palace, and security for all.

—Old Italian Proverb.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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OCTOBER 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Responsibility of Reward*

"THE reward of good work, well done, is more good work to do."

That is the fruit of confidence and good will. The twenty-ninth annual convention of American Bakers Association at Atlanic City was just that kind of a convention. The bakers and their allies filled a big hall and listened to great men tell how the baking industry was gaining greater confidence from the public by the work of the Association and the Institute. But every speaker, without previous exchange of ideas, pointed out "more work" which the industry must do if it is to meet the competition of other lines and regain its economic position.

Dr. Lee Frankel told how his company saved millions of dollars in policy claims and helped to prolong life by accepting the responsibility of health education. Merle Thorpe, famous editor of Nation's Business, told the baking industry it must work for its own place in the scheme of self government and progress.

The baker has also accepted this new responsibility, because he is seeing the reward of the past years of co-operation. The responsibility, the job, is so big that every group in the industry are already hard at work. The Bakery Engineers are changing the whole course of production practice through the leadership of the School of Baking. The Trade Promotion Section is spreading the knowledge of accurate records and profitable business methods. The Cake section is carving out a place for cakes among the nutritious foods. The Pie section is improving the business of restaurant service and selling better pies as better food. The House to House Bakers section is making of their distribution an accurately controlled business. The Retail Bakers are coming together to organize their special groups as a part of the big program. The Allied Trades have organized their ranks for a helping hand in every section of the industry.

Finally, American Bakers Association, through its officers and Board of Governors accepts its responsibility to supervise and carry on the big job with the industry. Supported by the state associations, the district association, the sections, the individual members, and the allied trades, the Association and the Institute will carry on nationwide nutritional education, national publicity, better correlation of national advertising, field service work, and industrial education, all of which should bring to the next convention still greater rewards of progress. Only those who attend the conventions and feel the spirit of accomplishment can fully appreciate the responsibility of service.

The Association and the Institute are grateful for this recognition of their capacity to serve the industry, and renew their pledge for "more good work to do."

L. A. Rumsey.

PROPERTY OF THE
HOME ECONOMICS DEPARTMENT
UNIVERSITY OF ILLINOIS

# *Our Call for Help*

EVEN casual readers may have wondered at the repeated references to the campaign to restore health by normal eating which are appearing in Baking Technology. When a few months ago the medical profession began to inquire into the effects of the fad, for slimness, on the health it seemed to us that the time had come for the baker to take an active part in spreading sound health doctrines.

The men who make our most substantial food should lose no time in joining hands with the three million members of the General Federation of Women's Clubs who are on record in opposition to unwise dieting and in giving widespread publicity to the dangers of reducing weight by self-prescribed fasting. American Institute of Baking is collecting the sound data on which every successful campaign must be built. The materials are ready for use. If ten thousand bakers would set to work beside the teachers, doctors, nutrition authorities and publicists who are trying to create a new fashion in human forms, which recognizes the beauty of healthful curves instead of the straight lines of starved bodies, real progress would be made.

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# *The Child's Bill of Rights*

"WHAT is a normal child"? asks the scientist. Herbert Hoover writing in the current Forum says that our conception of normal childhood is nebulous and inadequate. We are emerging from a period of reckless waste in which society has concentrated its efforts on the development of material resources. But our social thinking is still too much concerned with the standards of yesterday. What is today the chief obstacle to the attainment of the perfect child? "Ignorance," says Mr. Hoover.

The day of the child is dawning, is frequently asserted. The time has come when we must study childhood with critical zeal. What should be the ideal of our search for facts? That ideal has been set out by Mr. Hoover in "The Child's Bill of Rights," in which he says:

**The ideal to which we should strive is that there should be no child in America, that has not been born under proper conditions, that does not live in hygienic surroundings, that ever suffers from undernutrition, that does not have prompt and efficient medical attention and inspection, that does not receive primary instruction in the elements of hygiene and good health.**

We are seeing with a clearer vision than ever before that the chief need of our children is better food, supplied them whenever they are hungry in such quantities that every nutritional demand is fully satisfied.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of BAKING TECHNOLOGY, published monthly at Chicago, Ill., for October, 1926.

State of Illinois, } ss.
County of Cook, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared H. E. Barnard, who, having been duly sworn according to law, deposes and says that he is Editor of BAKING TECHNOLOGY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.
Editor, H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

2. That the owners are:

American Institute of Baking, a Corporation formed not for profit,
H. E. Barnard, Manager,
L. J. Schumaker, President, acting for American Bakers Association.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None.

H. E. BARNARD.

Sworn to and subscribed before me this 27th day of September, 1926.

(Seal) John Nalikowsky, Notary Public.
(My commission expires Dec. 14, 1929.)

# Cheese Bread

## *Feeding Tests Show That It Is a High Grade Food*

By Roscoe H. Shaw
*Chief, Department of Nutrition, American Institute of Baking*

FROM time to time unusual articles of food appear and we often think of them as new. Cheese bread, although new to modern times, can hardly be called a recent food discovery for bread with cheese as a component was known to the ancients. At that time in history when Greece was at her height in power; when the dazzling luxury of the period was at a point that has never been equalled, the simple bread made of flour, water and leavening was considered far too plebian for the dishes of solid gold that graced the table of the nabobs. It was too much like the bread of the lower classes. So all sorts of expensive ingredients were mixed with the dough. The historians tell us that no less than seventy varieties of bread were made at that period and one of these was cheese bread. It is needless to say that the cheese bread of ancient Greece was not such as has been recently studied at the American Institute of Baking, and about which a report was made in the June (1926) issue of Baking Technology, under the title "Cheese Bread, a New Bread."

### *Cheese Bread Popular*

Combinations of bread and cheese have for a long time been in favor as is evidenced by the popularity of the cheese sandwich. We also have cheese wafers and many other combinations of pastry and cheese. The new cheese bread is rapidly becoming popular for it is not only a bread that pleases the taste but it also has high nutritional value. The proteins of wheat are not biologically complete. They need supplements from the animal kingdom to balance them and milk proteins are well adapted for this purpose. Cheese bread made from the formula recommended by the American Institute of Baking contains nearly 12 per cent of proteins. This is almost one-third more than is found in whole milk bread. These proteins comprise both those of wheat and of milk and the latter are in a partly predigested form. Likewise the fat has been increased nearly one-half. This fat, of course, is butter fat which is not only of high nutritional value but has flavor imparting qualities as well, and is rich in vitamin. The carbohydrates of cheese bread consist not only of those of flour but also of the milk sugar of the cheese.

### *Rich in Lime Salts*

The wheat berry is lacking in lime salts which are so essential not only for growth but also for our health. The use of cheese bread greatly increases the percentage of lime in bread. One of the reasons for advocating whole wheat bread in preference to white bread is because it contains more lime. White bread made with one-third of its liquid ingredient whole milk, contains as much lime as whole wheat bread when made with water. If all milk and no water is used a much larger amount of lime is, of course, introduced. Cheese bread, however, is much richer in this respect than even whole milk bread. Bread containing 20 parts of cheese to 100 parts of flour may have 50 per cent more lime than the best whole milk bread. This of itself is a point well worth considering.

### *The Feeding Test*

In order to test the nutritional value

of cheese bread some simple feeding tests were conducted in the nutrition laboratory. These tests were carried out in the usual manner with young white rats in their early vigorous growing period. They were confined individually in cages of the Osborne type, and except for the cheese bread, received nothing but clean drinking water which was always before them. They were kept under close observation and weighed at frequent and regular intervals. From these weights the accompanying chart was prepared. The bread was made in the bakeshop of the Institute from the following formula:

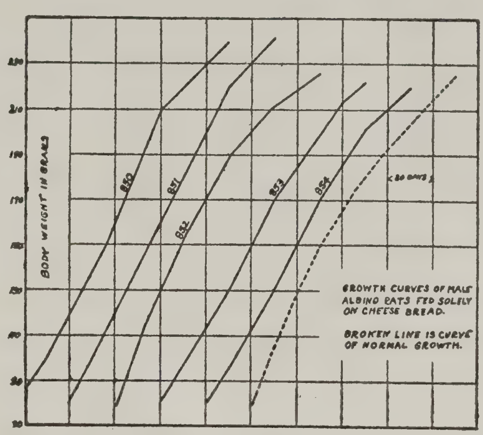
| | |
|---|---|
| Flour | 100 parts |
| Cheese | 20 parts |
| Water, according to absorption, approx. | 64 parts |
| Yeast | 2.5 parts |
| Salt | 1.9 parts |
| Sugar | 4 parts |

After baking, the loaves were cooled over night on racks. Next morning they were cut into thin slices and dried to the air dry condition; after which they were ground to a coarse meal in a power mill. The chemical analysis of the bread follows:

| | |
|---|---|
| Moisture | 33.61% |
| Ash | 2.28% |
| Protein N x 6.25 | 11.48% |
| Crude Fiber | 0.56% |
| Fat | 6.07% |
| Nitrogen-Free Extract | 46.00% |
| | 100.00% |
| Calcium (Ca) | 0.118% |
| Phosphorus (P) | 0.16% |

From the start the rats seemed to like their diet and ate heartily of it. They made consistent gains in weight and at all times had the sleek appearance of well nourished rats. The feeding period covered 90 days.

As will be noted on the chart the growth curves of the rats on cheese indicate normal growth, and it therefore may be assumed that as far as the growth of young animals is concerned, cheese bread is complete in all food essentials. The same rats will be continued on this feed for some time longer in order to learn the maintenance qualifications of cheese bread and this will be reported later.



## We Eat Less and Want It Plain

Where are the red roast beef and the mallard ducks of yesteryear?

They're in sandwiches, to be washed down with bottles of milk, aboard the dining car of the present day, says A. E. White, commissary chief of the Chicago, Burlington & Quincy railroad, who today completed thirty years of serving patrons.

"Twenty-five years ago," said the amiable superchef, "people ate much more than they do nowadays. A meal was an occasion. They ate red meat and beefsteaks and used whiskey to work up an appetite. And they ate mallard ducks, black bass, pies and plum puddings.

### *Eat Less and Want It Plainer*

"Today they eat less and want it plainer. A sandwich and a glass of milk constitute a luncheon for thousands of travelers."

Take light bread and heavy cheese if you are wise.

—Old Italian Proverb.

# Why Less Flour Is Eaten

*Substitution Among Foods is Changing Dietary Habits.*
*From Wheat Studies of the Food Research Institute.*

**No analysis of the causes for the lessened use of wheat flour has so fully set out the effect of increasing prosperity, diversification of the diet and declining total food consumption as has the recent publication of the Food Research Institute, Vol. II, No. 8 of its series of WHEAT STUDIES. In this concluding abstract of the report the authors stress the inroad sugar consumption is making on the cereal intake and venture the suggestion that while sugar may be substituted for flour in larger quantities than at present there is beyond a certain point no real substitute for the products of flour.**

### *Less Weight, Less Food Required*

There is probably a lower caloric requirement, also, due to reduction of body weight. An individual weighing 170 pounds will have a considerably smaller heat requirement than the same individual weighing 200 pounds. The vogue of the slender figure dictated by fashions for women, the preachment against overweight after middle age by the medical profession and life insurance companies, and the prevalence of sports after middle age all tend in the direction of lower body weight and a lessened caloric requirement. The net effect of outdoor sports is probably not in the direction of increased ingestion of food. Furthermore the development of street cars and other means of rapid transit, and in recent years the wide use of the automobile, have materially decreased the amount of walking. Much less energy is consumed today in getting to and fro, and there is less exposure to low temperatures in winter. These developments operate directly to reduce per capita food requirements.

All in all, therefore, there would seem to be a definite trend toward lessened food consumption decade by decade over the past forty years. Most of the changes have operated in that direction, and have overbalanced to a notable but indeterminate extent the few changes operating in the other direction. There is less inanition through inoccupation and poverty than was the case in the last century, which has the effect of raising the average food requirement. This, the increased feeding of adolescents, and the increased radiation from lighter clothing, are the only tangible factors operating in the direction of increased average requirement, against which we have the much more important factors of decreased physical exertion, lower average weight, and less exposure to cold.

## SUBSTITUTION AMONG FOODS

The general reduction in food consumption per capita between 1889 and 1919 very naturally had an effect on the consumption of flour. All in all, however, flour consumption held its own very well. The greatest increase among the foods for which we have statistics, occurred in the consumption of sugar, the greatest decrease in corn meal. While the general totals seem to show that sugar was being substituted for corn meal, with flour consumption changing but little, the facts seem scarcely subject to this interpretation. It seems rather that there has been relatively little direct substitution of sugar for corn meal, but, instead, a pronounced shift from corn meal to flour, especially in the South; and, on the other hand, an equally important substitution of sugar for flour on the part of people who were previously using large quantities of flour.

This question of the exact process by which consumption of sugar has been increased and consumption of corn meal decreased, with flour consumption declining relatively little, prior to 1919, is one of great importance. If one could suppose that sugar was being substituted for corn meal directly there would appear to have been no very strong tendency to abandon flour for other foods. The question for the future would be, now that consumption of corn meal has fallen so low, will it give place further to sugar, or has the shift come to an end? But if the actual process of the change has been one of replacement of much flour by sugar on the part of certain groups and replacement of corn meal by flour on the part of other groups, as appears to have been the case, the question as to the future must be framed very differently. In this case we have two questions: will the groups which have already replaced much flour in their diet with sugar carry the substitution further? And will the groups which have turned from corn meal to flour follow the example of the other groups and begin to abandon flour in its turn for sugar? Certain it is that there is little opportunity left for flour consumption to gain at the expense of corn meal.

### *Prosperity Brings New Food Habits*

Regarding the other changes in food consumption, for most of which we have no reliable statistics, it appears clear, nevertheless, that the general trend of the past forty years has been in the direction of diversification. There is a trend toward decreased consumption of wheat, coarse grains, dried legumes, and meat, and to increased consumption of poultry and eggs, milk, sugar, fruits and fresh vegetables. These trends are not synchronous, but are irregular. This diversification of the diet is the result of prosperity, improvements in agricultural products, improved methods of distribution and storage, prolongation of seasons, improvements in processing and packing, improvements in household culinary equipment and practices, aided by a trend of dietetic education in the direction of diversification, and supported by advertising campaigns. The diversified diet is distinctly more expensive than was the staple diet it has supplanted.

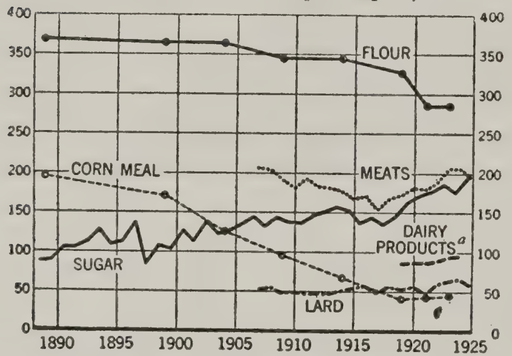
In the course of this diversification bread has become more and more an incident and a vehicle. This has had the effect, apart from other considerations, of lowering the intake of flour. When bread is eaten with butter, jam or other spreading materials, less bread is eaten. The coarse grain breakfast cereals eaten with sugar and milk or cream replace wheat flour. Increased consumption of pastries and sweet baked goods of all kinds tends to diminish the unit consumption of flour. At the close of the last century the American consumption of wheat was comparable to that of the British; it is now distinctly lower. All of these influences tending in the direction of lower flour consumption vary from region to region, from year to year, and from class to class, and find their expression in the present low flour consumption. Against this, one can point to but one gain for wheat flour: namely, the increased use of wheat as against other cereals in the South, resulting from industrialization. Had not wheat flour replaced corn to a notable extent, the present per capita consumption of wheat flour would be considerably lower than it is. For the future one can look to but little gain for flour in this field, since the replacement is almost complete.

## RECENT CHANGES IN FOOD CONSUMPTION

Developments since the war present a sharp contract to earlier shifts in food consumption. Prior to the war, the notable changes in consumption of the foods for which data are available consisted of a decline in total consumption per capita and a progressive substitution of sugar for the cereals. About 1918 there began an increase in meat consumption, chiefly in the form of pork. Between 1919 and 1921 flour consumption declined sharply, its decline offset by an equally striking increase in sugar consumption. Meanwhile meat consumption continued to increase. In 1923 consumption of meats and dairy products, per capita, rose to new high levels, maintained in subsequent years.

**Apparent Consumption of Important Foods**

**(Thousand calories per capita)**



a Excluding whole milk, and including oleomargarine.

Study of the data suggests that the forces leading to a downward trend in per capita food consumption have worked themselves out and been replaced by other forces, for per capita consumption seems to have been approximately stationary during the war and to have started definitely upward about 1922. As will presently appear, however, the forces responsible for the declining food consumption prior to the war are probably still in operation, but have been offset in recent years by more powerful, though temporary forces, tending toward increased total food consumption.

### *Change to More Expensive Foods*

The most striking and significant characteristic of the changes in food conconsumption since 1919 is the tendency to increased consumption of the more expensive foods and to decreased consumption of the less expensive foods.

The explanation of this shift to more expensive foods is to be found chiefly in the greater prosperity of the laboring classes. Throughout the war there was practically no unemployment and wages kept up very well with the increased cost of living. According to Professor Alvin H. Hansen, for example, real wages in the United States remained substantially unchanged between 1900 and 1919. With the drop in prices in 1920, however, money wages fell much less than the cost of living. Real wages, that is, wages measured in terms of purchasing power, were 9 per cent higher in 1921 than they had been in 1919. In 1922 real wages, according to the same authority, were 14 per cent higher than in 1919, and in 1923, 23 per cent higher. During 1921 and part of 1922 there was much unemployment, but with the recovery of business in the latter part of 1922 labor generally reached a level of prosperity never before experienced. With this increased prosperity has come a tendency to eat more expensive foods.

### *Increasing Sugar Consumption and Declining Flour Consumption*

Special importance attaches to the explanation of the increase in sugar consumption since 1919. While consumption of meats and dairy products appears to have increased with that of sugar, the decrease in flour consumption is probably more closely related to the increase in sugar than to the increase in meats and dairy products. There is considerable waste in meats between the stage of production, to which the figures actually apply, and the stage of final human consumption. The percentage of waste in this form has undoubtedly increased over that of the war years, and may now be larger even than in the pre-war years. Sugar, on the other hand, is subject to very little waste at any point between the refinery and the table of the consumer. The increased apparent consumption of sugar, therefore, probably explains the decline in flour consumption better than does the accompanying increase in apparent consumption of meats.

It is by no means clear that the increase in sugar consumption since 1919 can be accounted for by the tendency toward a use of more expensive foods. The substitution of sugar for alcoholic beverages since the Volstead Act is another widely noticed but incommensurable factor bearing on the increase of sugar consumption and the decline of flour consumption.

### *The Use of Sugar Grows Steadily*

The increase in sugar consumption since 1919 probably represents little more than a continuation of the earlier trend. It is entirely possible that no new factor of great importance has been involved; that there has been little more than a continuation of the tendency toward displacement of the cereals by sugar which has been in progress for the last twenty or thirty years. Such an explanation is consistent with the fact that flour consumption has declined much more sharply in recent years. As previously noted, the substitution of flour for corn meal had probably gone, by 1919, about as far as it is likely to go for some time to come. Under these circumstances, the brunt of the decrease in cereal consumption naturally fell on flour.

Of these three possible explanations for the recent sharp decline in flour consumption, the first two (increased prosperity and the Volstead Act) involve factors which have probably exercised already most of the influence likely to be observed. The third explanation, however, involves a factor which has shown no tendency to diminishing influence: the progressive tendency toward displacement of the cereals by sugar. Any forecast of the future must depend largely on a judgment as to which of these three explanations deserves to be given the greatest weight.

### *Other Influential Factors*

Certain other factors which may have influenced flour consumption deserve mention, though their effect has probably been very small. Some economies have undoubtedly been introduced by the expansion of the baking industry. Whether the use of flour of higher gluten-content has resulted in the eating of less flour in the form of bread, however, may well be questioned. The expansion of the baking industry has probably increased rather than diminished the stale bread loss, since most consumers refuse to buy old bread which they would eat without hesitation if it had been baked in the home.

It is frequently urged that the war-time injunction to eat less wheat has carried over into the subsequent years; in short, that the post-war decline in flour consumption proceeds from a projected wartime influence acting on both households and public eating-places. The statistics, however, and the facts of common observation, lend little support to this theory. Indeed, one may incline to the view that revulsion against the enforced use of unsatisfactory wheat substitutes during the war has had the post-war effect of increasing wheat-flour consumption at the expense of substitutes. The only influence which has clearly persisted is the practice of charging for bread at public eating-places. This practice, instituted during the war, has been continued in some places and is probably a real, though minor, factor tending to restrain bread consumption.

## PROBABLE FUTURE TREND OF FLOUR CONSUMPTION

In attempting to appraise the probable future of flour consumption, it is well at the outset to concentrate attention on the really important factors. From these we shall get our best indication of the general character of any change likely to be observed. After all, the influence of minor factors must generally be so small as to be negligible beside the inevitable uncertainty regarding the probable course of the major factors.

The principal forces which have influenced flour consumption in the past seem to fall readily under four heads, with some overlapping. These may be listed as (1) prosperity, (2) diversification of the diet, (3) declining total food consumption, and (4) the inroads of sugar on the cereals.

### *Influence of Prosperity*

The influence of prosperity, as distinguished from the diversification of the diet to which it is in some degree related, is reflected primarily in the use of more expensive foods in the place of flour. Among some classes, however, increasing prosperity has resulted in increasing use of flour in the place of the coarser cereals. In its most striking form the influence of increasing prosperity has been a phenomenon of the years since 1919, the accompaniment of an extraordinary increase in real wages. This striking increase in prosperity of the laboring classes has probably come to an end. Some think that a slow increase will continue, while some, on the other hand, hold that wages are now at higher levels than can be maintained. In either case, the changes during the next several years must be slight, and one may confidently predict that the next several years will see neither a repetition nor a reversal of the striking changes in food consumption which occurred in the period of 1919-23.

### *Diversification of the Diet*

Diversification of the diet, except as it accompanies a striking change in general prosperity such as that just discussed, is a result of improved facilities for handling and supplying foods, of education in the dietary values of certain foods, and (in no small degree) of propaganda and advertising. In part, also, it is the natural accompaniment of a type of slow increase in prosperity which stands on a different footing from that discussed above. In general it takes the form of increased consumption of fruits and vegetables and of dairy and poultry products. To some degree increased consumption of these other products tends to displace flour, but their competition is probably more with meat than with flour. Such diversification of the diet may be expected to continue slowly, but its further influence on flour consumption can scarcely be great.

### *Declining Total Food Consumption*

Declining total food consumption has been a factor in the past which would probably be found to have affected flour more than many other foods if we could actually isolate the effects of individual factors. Flour forms the basis for some of the principal staple foods of which the heavy worker must eat so abundantly. With less physical exertion and decreased food consumption there is a tendency also too shift to lighter foods.

The decline in total food consumption per capita will probably continue. There are still great opportunities for the introduction of labor-saving machinery in many lines, and the industries of agriculture and forestry will probably continue to decline in relative importance. But it is equally clear from a study of these factors that the decline in food requirements cannot continue indefinitely, and it may even now be approaching its limit. Men engaged in strictly sedentary occupations taking the amount of exercise necessary for their continued health require as much food as men doing light physical work. The proportion of the population engaged in heavy physical work is already fairly small, and further reduction must come slowly. As for the various other factors which have influenced total food consumption, the future is problematical, but their importance is relatively small and for their present purposes they may be disregarded.

### *More Sugar, Less Cereal*

The possible inroads of sugar on the cereals, however, cannot be passed over so lightly. If our analysis of the situation is correct, flour consumption decreased very sharply among certain classes, even before 1919, its place in the diet being taken largely by sugar. The magnitude of the decrease in flour consumption among these classes was obscured, however, by important increases among other classes where flour was taking the place of products of the coarser grains, especially corn meal. This field for expansion of flour consumption is now almost exhausted. Will the progressive decrease in flour consumption then continue among all classes with no substantial increase anywhere in the United States to offset it?

Our basis for answering this important question is unfortunately meager. We have no strictly similar experience in any country or time which might furnish a useful parallel. Certain pertinent facts affecting the situation, however, are perfectly clear. Sugar is really a fairly cheap food. Pound for pound, sugar contains about 13 per cent more energy than flour. At recent prices, sugar has been but little more expensive than flour as a source of energy, and seldom in recent years has it been twice as expensive.

### *Use of Sugar Limited*

Sugar is a highly palatable food, and moreover is entirely wholesome when adequately supplemented with vegetables, meat and dairy products. From a dietetic viewpoint, there is no reason why sugar should not be substituted for flour in considerably larger quantities than at present.

On the other hand, we have the fact that an excessive amount of sugar is distasteful to most people. Beyond a certain point, there is no real substitute for the products of flour. A considerable portion of our population is undoubtedly using all the sugar it cares to at the present time. In this group there will probably be little further substitution of sugar for flour. The really important question for present purposes is, how large and important is the portion of the population which may be expected still further to substitute sugar for flour? For this question we do not now have the facts to give any positive answer.

### *Flour Consumption Will Probably Decrease*

Summarizing, then, it may be said that the striking decline in per capita flour consumption during the last 20 or 30 years has been the inevitable result of certain fundamental forces which have been operating during the period. Looking to the probable future effects of these same forces, it appears that those which may be summarized under the three heads of increasing prosperity, diversification of the diet, and declining total food consumption, will probably continue to operate in the direction of decreasing flour consumption. The magnitude of their effect will probably not be great. But the influence of factors involved under the fourth head, the inroads of sugar on the cereals in the American diet, may be much greater. The probable magnitude of this influence in the future must remain conjectural until more information is obtained.

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## *Clown with Bread Calms 14 Elephants on Rampage*

Edmonton, Alberta, August 3.— (A. P.)—Music hath charms to soothe the savage beast, but bread is better.

Fourteen circus elephants went on a rampage here and began tearing up the town when a dog barked at them. Everybody ran. The elephant man, chased into a cemetery, saved his life by dodging behind tombstones.

A clown rider of the circus rode around and bought all the bread in town. Then, stepping out boldly with the enticing loaves, he coaxed and hobbled each pachyderm and took them all back to the tent.

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Throw no gift again at the giver's head;
Better is half a loaf than no bread.

—Old English Proverb.

## *Selling "Nutrition"*

IN the series of sound and interesting articles which Winifred Stuart Gibbs is writing for the McClure Newspaper Syndicate one has recently been printed by the Food Bureau of the New York Telegram which emphasizes the importance of selling nutrition to every man and woman.

If public health is purchasable, as a wise sociologist, Porter Lee, declares, the importance of sound nutrition may be sold to a community. But the sale will never be made by the health authorities working alone. Every business man who handles food should be one of the salesmen. Every teacher should use her schoolroom as an opportunity for the teaching of nutrition. And the whole community can help in making the right contacts and in supporting the work. The way to do it is admirably summed up by Miss Gibbs as follows:

"Those of us who desire eagerly the day when all citizens shall be well nourished may well follow the suggestions made by Dr. Beachley, president of the South Carolina Public Health Association and apply them to the field of food and feeding.

"First, our neighbors, our children, our communities must be educated in the use of nutrition terms and introduced to authoritative works in nutritional literature. Almost any one of us may help here. Whatever our home associations, we may see to it that we spread the knowledge of nutrition in that home. If the children are blessed with one of the numerous teachers who know dietetics we may make it our business to get in touch with that teacher, and we may, under her guidance, perhaps, work out a joint program for the youngsters—a program that shall care for their food both at home and at school.

"Then we may seek out our local editors and enlist the mighty power of a sympathetic press in the campaign for a better fed race. When our schools accomplish something especially worth while we may make it our business to let the press know about it. The busy health workers who administer the projects may not have time to do so.

"Lest any lay reader rise at this point to say that all of this is very pretty to read about, but that it lacks practicability, one should hasten to amplify.

"While it is true, that for organized health and nutrition work, specialists and educators are far better fitted to act than are average citizens, it is also true that these same citizens must bear their part or the teachers' work will not come to full fruition."

## *More About Reducing Breads*

THE evidence as to the merits and demerits of reducing bread is piling higher and higher. After a while the group of over stouts who are seeking simpler lines because their doctor has told them that too much fat is a debit in one's health account will ask him to prescribe sane methods for cutting down weight instead of following foolish advertisements and hunting for shortcuts to normality. An excellent bit of evidence as to the absurdity of eating expensive breads for a reducing diet is supplied by Dr. Lulu Hunt Peters in her syndicated column, "Right Eating and Good Health." Answering a correspondent who seeks information about some special "reducing bread," Dr. Peters says:

"I haven't any personal knowledge of the reducing bread you speak of. However, I have heard from a friend who tried it, and she tells me that it is a coarse bread, apparently made of whole wheat and perhaps some added bran, with a very delightful flavor, and she likes it immensely. It is apparently good for constipation. However, she does not reduce unless she limits her total calories, including the bread, very markedly.

"Last summer I sent for a loaf of a reducing bread which is well advertised. That, too, was apparently a whole wheat bread. It was accompanied by directions to eat nothing made of white flour, fats or sugars, and to eat but one loaf of the bread in a week. It is easy to see where the reduction process came in.

"One of the obesity breads was analyzed in two recognized laboratories and it was shown to be similar in composition to the average graham (whole wheat) bread. Dr. Wiley wrote: 'There is only one way in which this bread will reduce, and that is, don't eat much of it nor much of any other kind.'

"There is no bread nor any other food than in itself will reduce. If you do reduce while using it, it is because you have omitted other foods high in caloric value (heat or energy and also fattening value). These "reducing" breads are usually good-tasting breads, but no better than other well-made breads, and they are three or four times the cost. The producers anger me for they falsely educate the public besides take its money under false pretenses."

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"I think the bread posters are the most striking piece of advertising I have ever seen. I have had them hanging on my office wall for a couple of weeks and yesterday my small boy, attending Friends' School, begged to be allowed to take them over to his school for exhibition purposes. You have done an excellent piece of work."

—Merle Thorpe,
Editor, Nation's Business.

# Bread and Adequate Nutrition

By Royal S. Copeland, M. D.*

"I WILL take care of my enemies but Heaven must defend me from my friends," said some wise man of olden times. There is a lot of truth concealed in this saying.

Often I wonder at the utter lack of psychology shown by the leaders in some industries. For instance, the railroads are protesting the abolition of the Pullman surplus charge. With this bill pending in Congress, the same railroads put out broadsides bragging about their tremendous increase in profits during the past six months.

The argument has been used that to cut off the millions realized from the surplus charge, would necessitate raising the freight rates on corn and wheat. But somebody is sure to ask why this is necessary and why a few millions cannot be saved the people anyhow when the profits of the railroads mount into many millions.

Undoubtedly there is an effective and convincing answer on the part of the railroads. This I will not deny, but, regardless of that, the railroads are the victims of their friends in the industry. Their publicity is incomplete; therefore it is damaging. Half truths are harmful always.

In marked contrast to this situation in the transportation industry is the wisdom shown by the baking industry. You have The American Institute of Baking and through its publication, Baking Technology, the public is given definite and complete information of the needs, ambitions and achievements of your industry.

If you have not read the June 15th number of your official journal, please do so. The leading editorial, "Safe Weighs to Health," should be read by every man and woman in the United States.

### *Fads in Diet*

This article emphasizes the evils attaching to the present day fads in diet. It recites in convincing manner the need for creating a sound public opinion regarding the proper relationship of food to flesh. It points out the need for ample diet and for the choice of substantial foods in such a diet.

This editorial includes the resolutions passed by the General Federation of Women's Clubs, warning the women of America against imperiling their health and that of future generations by foolish indulgence in starvation methods of weight reduction. "If one has either an inherited or acquired tendency to overweight the condition must be corrected," said your editor. He continued, "But it is just as dangerous to self-prescribe remedies for pathological conditions of obesity as it is to attempt to regulate the functions of heart and kidneys without expert assistance."

### *Bread-Making Our Oldest Art*

You are engaged in one of the oldest of the domestic arts. Bread is the most ancient of the prepared foods. Whether we give credit to the Chinese or to the Egyptians, we know that long before the beginning of the Christian Era they were making leavened bread. I doubt not that Cain, the original tiller of the ground, was the first of all men to make unleavened bread. Uncooked food had become unpopular in the Adam family and I doubt if apple-tart was ever seen upon their table. About that time, in all probability, bread became the staff of life!

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*An address made on Institute Day at the annual convention of American Bakers Association.

Bread-making is our second largest industry and is rivalled only by the dairy interests. The last available figures are as follows:

The annual consumption of meat in the United States is 16,000,000,000 pounds.

The consumption of bread is 38,000,000,000 pounds.

The consumption of milk is 99,000,000,000 pounds.

The figures I have given for milk include butter, cheese, and all other products of milk. Only about 45 per cent of the total milk produced is devoted to household uses for drinking and cooking. It will be seen, therefore, that bread and fluid milk are running a neck and neck race in the popular esteem.

### *Declining Consumption of Flour*

It is with a sense of sadness I read every once in a while that flour and flour products are not so commonly consumed as they used to be. Good bread is indeed the staff of life. It would be a pity to have its popularity fall on evil days.

The Department of Agriculture says there was a steady decline in the use of flour from 1879 down to 1921. It was during the war, particularly, that the rapid decline took place, averaging about two per cent a year. Since 1921 the consumption per person has remained about the same.

I suppose the nut products, as well as the use of various cereals and breakfast foods have contributed largely to this decrease in flour consumption. As I view it, it is just as important now to have every family make free use of bread as it ever was. Of course we have such a variety of food-stuffs these days that we do not depend upon the staple articles as we used to do.

Well-made bread is as valuable and necessary today as it was in pioneer time. As a matter of fact, it does make up in bulk about one-third of all the food consumed in the American dietary. It is interesting to observe in this connection that the portion of the family budget spent for bread represents only one-tenth of the total food costs of that family. You see that bread is not only wholesome and nourishing, but it is cheap. It should be used as a matter of economy if there were no other reason.

Have you ever given consideration to the matter of the home budget? From a third to a half of the expenditures in every home are made for food. If bread were to resume its old-time popularity, the food budget would drop materially.

Our chief foods are carbohydrates and proteins. Bread supplies both these elements. Some of the food experts contend that the protein of bread is equal to the protein found in meat and milk, and better in many ways than the protein from other cereals than wheat.

About one half of every loaf of bread made from superior flour consists of carbohydrates. Molasses syrup, honey, and preserves are, of course, types of carbohydrates. You can see that the price of a half loaf of bread would not buy quantities of these food products.

The modern bread makers are adding milk to the mixture. This makes bread still more valuable. The old-fashioned people who used to make a meal out of bread and milk didn't appreciate what real scientists they were. They were giving themselves the minerals, protein, carbohydrates, and vitamins essential to the development of a vigorous body and glowing health.

More and more the scientific farmer is feeding his animals the right mixture to keep them in health and vigor. The head of every household ought to use the same good sense in planning the meals for the family. It is gratifying to find that housewives are paying more attention to the "balanced diet" and are giving the children as well as the grown-ups the sort of food they need for their well-being.

### *A Plea for Simple Living*

There are so many wonderful foods on the market and such wonderful cooks in the world that we are all tempted to make every meal a complex thing. It is too bad our lives are not more simple. One has but to glance at the bill of fare in any hotel or restaurant to realize how tempting are the opportunities of the present day. The earth is combed and the waters under the earth filtered to find something new for us to feed upon. All this does very well for a wedding anniversary, or to celebrate some other great event. But our daily fare should be less elaborate.

The simpler the program of living is made, the greater is the chance of long life. The rich, highly flavored, complicated foods eaten in quantities by many an over-fleshy individual, is taking years off the life expectation of the epicure. Self indulgence at the table is deadly in its possibilities.

In bread, milk, and fresh vegetables we have the prescription for health and long life. The yeast, the lard, the milk, and the cereals are things the body needs. The butter, the cheese, and the jam eaten with the bread make important additions to the up-building of the body. The phosphorus, the iron, the sulphur, the lime and the other minerals make bone and teeth and hair.

When I consider the quantities of demineralized foods eaten by the American people, I wonder that we have health at all, and really marvel that we are not all bald-headed. It is not work that gives health and vigor to the finger-nails of the countryman; it is the model food he eats.

In the country the Sunday night meals and many other body building meals consist of nothing but bread and milk. In every crockery store they used to sell "bread and milk sets"—a plate, bowl and pitcher. I wonder how many city folks ever heard of such an idea.

Truly, bread is the staff of life. There are a few articles of food which are cheap at any price. Bread is such a food.

### *Food Adulterations*

My rather large experience in pure food administration caused me to reach certain conclusions regarding the practices of the manufacturers and handlers of food. The first of these conclusions is that the largest, best-known, and influential members of this group are those who observe the law. The tricksters are the obscure and indifferent producers. The leaders cannot afford to take chances. If they had no higher motive, they would hesitate to violate the provisions of the Pure Food Law.

I am glad to say the reputable producers of foods have never failed to cooperate in the formulation and administration of the food ordinances. But regardless of where the chips fall, we must hew to the line. Health is too dear to all of us to take any chances on the strict enforcement of the reasonable provisions of the law.

The bread made now by the commercial bakers is more uniformly good than was the home-baked product. There are many reasons for this. In the first place, the flour is made by standard methods out of properly blended wheat. The commercial baker can control temperature and humidity as the home baker could not.

The famous breads on the market today are pure in materials, devoid of deleterious drugs, rich in the food values of the ingredients and deliciously presented to us. We are fortunate that we are able to get wholesome and nutritious bread at a reasonable price. We can eat it safely and to the advantage of our bodies.

### *Eating and Athletics*

Every American was proud of our athletes in the Olympic Games. One of the most important duties of the trainers in charge of them was the supervision of the diet of the athletes.

Unless good judgment and care are exercised in the selection of the kinds of foods eaten, more harm can be done to the prowess of the athlete than could any injury that could befall him. That the trainers in charge performed these duties properly is established by the excellent results obtained by our contestants.

One of the most remarkable features of the Olympic Games just completed, was the splendid showing made by the athletes of Finland. The competitors from this little country won ten firsts, as compared to twelve firsts captured by the athletes of the United States.

Just think of a country with a population of 3,500,000, which is a little more than half the population of New York City, producing athletes who successfully competed against the cream of the athletes from all the rest of the world. They were only beaten by the United States, which has a population of 100,000,000 from which to develop champion sportsmen.

In all the running races, which called for endurance and stamina, the entrants from Finland excelled. The Marathon Race was won by a Finn who finished in far better condition than any of the other contestants. In another distance race in which only 15 out of 34 contestants who started the race, finished, both first and second places were taken by Finns. In considering this remarkable showing I wonder if the foods eaten by these hearty Finns are not in a large measure responsible for this wonderful display of physical endurance.

The strength, reserve, and stamina of any individual are due largely to the kinds of foods eaten. If we want to increase the physical power of our athletes, as well as of all the race, we must learn to select suitable foods. In selecting a diet, bear in mind it is not the quantity eaten that counts. It is the kind of food eaten that does the good. In all cases the natural foods are the best foods. No one can be better than old-fashioned bread.

### *Bread the Essential Food*

When I was a boy I was sent with a tin bucket once or twice a week to get a "penny's worth of yeast." That same night everybody tiptoed around the stove behind which was a "setting" of bread, for fear it would "fall."

In those times bread-making was a household art and every housewife was depended on to supply the family with its most important food. The social standing of the housekeeper depended on her ability to make good bread. In that period the most tactful remark made at table was "How light and delicious your bread is!" At such moments mother tried hard to appear unconcerned!

How different it is today. As compared with the amount furnished by the great bakers, very little bread is made in the home kitchen. More and more do we depend on the corner grocery for our daily supply.

So vital is this article of food that the word "bread" stands for all we eat, and when we pray we call upon Divine Providence to "give us this day our daily bread." This seems most appropriate because it is our most vital food, well-named the "staff of life."

Bread contains all the essential elements of food. It has ten or twelve per cent of protein, fifty to sixty per cent of carbohydrates, about one per cent of fat, besides water and certain necessary minerals. Spread with butter, good old-fashioned bread becomes an almost perfectly balanced ration. Add to several slices of bread a couple of glasses of milk, and you have given yourself a first class meal. Such a meal throws upon the digestive organs the minimum of effort and yet it supplies your body with all the essential elements for repair and growth. Every meal should present bread in some form, but it must be honest bread, made of real flour, properly mixed and well baked. The great bakeries have learned that the old-fashioned recipes are most satisfactory. The fashion for over-refined flour has gone out and we are getting real bread.

### *The Need of the Baking Industry*

What is the chief need of your industry?

Far be it from me to volunteer an excursion into your affairs with a view to any solution of your troubles. But you asked me here to address this great convention. I should feel my visit were a vain one unless I offered something of a practical nature.

You need greater publicity of the advantages and indeed the necessity of bread in the national dietary. You must offset propaganda against bread by more vigorous propaganda for bread. You must fight the fire of sensationalism by setting fires of scientific argument for the splendid product of your bakeries.

You have on your side the ancient and honorable history of bread, the staff of life. You have scientific proof of the value of bread to the human family. You have a substantial, economic and sensible foodstuff to offer the public. When once the public is educated to the place bread should have, the demands will increase with each month.

I have spoken almost exclusively of bread. With equal force and scientific accuracy we may speak of cake, pie, and other pastries, the substantial foundation of which is flour. Let no one attempt to say that they are harmful to the human race. They are not. On the contrary they make for health, vigor and long life.

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You have one of the best of the technical journals, and I find much good reading and sound information in it aside from its purpose to better serve the baking industry.

I wish you success in your efforts to bring "common sense" into the field of dietetics, especially in relation to breadstuffs.

**—Robert A. Sage,**
**Washington, Iowa.**

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"Thank you for the posters which you have sent to us. They are very attractive.

"I am exceedingly glad that you are adopting the policy of emphasizing the desirability of using bread with other basic and essential foods. It seems to me deplorable that in the advertising of certain goods, manufacturers and their advertising departments attempt to leave the untrained public under the impression that perfect health is assured by the consumption of their own particular article.

"I cannot help resenting a good deal of the advertising of the people who prepare foods."

**—Mary E. Parker,**
**Head of Department of Household Administration,**
**Western Reserve University.**

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"We thank you for your announcement of the courses of your School of Baking. This is the first material we have received on baking schools and we appreciate it highly."

**—Bu. of Educational Research,**
**Ohio State Univ.**

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Blessed is the house that has oak wood and wheaten bread. **—Old Italian Proverb.**

# "Pie—the Most Popular Dessert"

An Address by HARRY J. BOEKENHOFF
*President, The National Restaurant Association**

**It is as important to follow baked products through the hands of the distributor to the consumer as it is to inquire into their composition. Millions lunch and dine at restaurants. Their chief dessert is apple pie. In an address at the annual convention of Wholesale Pie Bakers the president of The National Restaurant Association showed how quality in pies helps business for the restaurateur who sells them and the baker who builds them.**

I WAS born and brought up as a baker. I still find myself in imagination wiping the dough from my hands. I love to run my fingers through a special milling of good flour and the scent of the dough room always calls back boyhood scenes.

So while I am not absolutely one of you in my daily business, I think I know your state of mind and something of your problems. I have lived through the evolution of the baking business from the time when a majority of its operators were basement tenants, working with themselves and the members of their families to make a meager livelihood until today it occupies plants covering acres of floor space, bright with the sunlight, cheerful and clean, inviting and demanding the best talent of skilled workers and trained research men and yielding annually a handsome profit on millions of investment.

My present line of business is going through the same evolution so that today the restaurant industry is leagues removed from what it was a quarter of a century ago.

It may be that your section of the baking industry has not yet caught the full vision of the enlarged opportunities and the possibilities that come from an organization that functions properly. While I have no particular purpose to step aside from the main topic, I am an ardent advocate of organization. I have seen what organization has done for the baking industry and I am seeing what it is doing for the restaurant industry and I am confident that if there are problems in the preparation, distribution and sale of pies on a commercial scale, that the right sort of organization will be a tremendous aid to solving those problems then and having them good enough so that they will sell readily.

### *Pies at a Dollar Apiece*

I recall about 15 years ago there was a baker in Pittsburgh who had the courage to bake a special type of mince pie for the holidays for which he charged and received one dollar per pie. Bakers used to talk about that every time they got together at a convention. They thought it an unbelievable price and the pie was supposed to be extraordinarily good. That man had a vision and he had nerve. Pies in that day sold for a song and some of them, were not worth much more than a song. Now in the better type of restaurant a dollar pie would scarcely cause a ripple.

It is true that prices are higher than formerly. It is a fact that pies cost more when we make them ourselves. But what

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*Given at annual convention of Wholesale Pie Bakers.

I mean is that we have come to think in terms of quality and not in terms of price alone. We have found, and are finding, more and more, that the American people, with few exceptions, will pay the necessary price for what they want to eat and they are getting more and more particular. We are also finding from our own point of view that it does not pay to do business without a reasonable margin of profit. We do not, therefore, try to absorb every advance but keep the usual ratio of profit and pass on the changes to our customers.

Pie is a very important factor in the general restaurant business. I think I am safe in saying that in many types of the popular eating places it ranks next to coffee in determining the character of the volume business and that in some places it will run as high as 15 to 18 per cent of the gross business. I know one restaurant in Cincinnati that on a check proved that 90 per cent of all customers ordered pie with their luncheon.

### *The Home Dining-room is Passing*

There is no doubt at all in the mind of the restaurant public that the American public is eating away from home more and more. Therefore, the field of the restaurant pie is growing wider every year and to whatever extent you are interested in catering to restaurant business, you have a steadily increasing field.

I have heard it said, and have no reason to doubt it, that the restaurants are the largest patrons of this group I am addressing. I also am aware, and I believe you are aware, that a great many restaurants prefer to bake their own pies. It may be profitable to both of us to consider the reasons that are underlying this condition.

I believe that any sort of an analysis will show that two considerations are chief, and these considerations may be subdivided into a number of minor reasons. The two main reasons why restaurants prefer their own pies are—first: price and second: quality.

I put these factors in this order, not because they belong that way but because one of them can be removed and the other cannot. Whether or not it is cheaper for the average restaurant to make its pies rather than buy them depends upon a variety of conditions and of course on the way you keep your books. Thus it is possible that a restaurant operator may figure he is saving money by making his own pies while in reality he may have an unwarranted investment and a needlessly high labor charge. In large restaurants where it is the rule to bake their own pies, it is now generally true that the pie baking crew does nothing else. Frequently there are special ovens which have no other function in the restaurant than to be used for pies. If the volume of business done by this restaurant does not justify the investment and equipment and the regular charge for labor for the number of pies produced then from a strictly commercial standpoint the restaurant operator is not justified in performing this service for himself.

### *Quality, Quality, Quality*

We come then to the consideration of quality, and here it is necessary to speak at once with candor and with kindness. A great many restaurant operators feel that they cannot secure as high quality pastry in the open market as they can make for themselves. You must not forget that in recent years the restaurant industry has undergone a change by reason of many women coming into it, lots of whom have had the advantage of college training and who have a high degree of technical skill in the preparation of pastry. Furthermore since the World War with the large influx of women into industry and consequently becoming patrons of restaurants, both the demand for pastry has increased and the quality expected has been raised. To such an extent is this true that last year the National Restaurant Association conducted a pie-baking contest as a feature of its annual convention. The interest in this event was widespread and intense.

You may care to know that we established as our standard a ten inch pie and that we fixed the material cost at thirty cents. We recognized at the time that this was a fairly high figure but it was selected for the very reason that we wanted a quality pie and we knew that quality could not be secured without proper allowance for high-grade ingredients.

### *Scoring Pies*

Preceding this contest, the National Restaurant Association had conducted a survey of a pie standard and found that while there has been a great deal of study on this subject in most of the colleges and universities where cooking is taught, there was not at that time and there is not at this time any recognized uniform standard of excellence in pies. For our contest we judged the pies in the contest on the following basis:

| | | |
|---|---|---|
| Upper Crust | | 30 |
| Appearance | 15 | |
| Texture | 5 | |
| Flavor | 5 | |
| Filling | | 50 |
| Consistency | 10 | |
| Flavor | 30 | |
| Amount | 10 | |
| Under Crust | | 20 |
| Texture | 15 | |
| Flakiness Baking Flavor | 5 | |
| Total | 100% | |

In selecting apple pie for our contest, we were simply appealing to the largest group, since the testimony of all restaurant operators is that year in and year out apple pie is the best seller. Also from a critical standpoint, probably more poor apple pie is offered than any other of the standard makes of pie.

It seems that the flakiness of the crust and the flavor of the contents are the two outstanding demands of the public. The public is not interested in the keeping qualities of the pie or in the difficulties of transportation or in the effort necessary to have the pie fresh when it is served. These, then are the mechanical and scientific problems which you must work out for yourself if you expect to compete successfully for the ever increasing volume of pie business in the restaurants of this country.

Restaurant operators certainly will insist that pie be delivered fresh, that they be delivered in good shape and that the crust and body of the pie be as flavorable, as handsome and as appetizing in appearance as any which they can make in their own kitchens.

### *Foundry Pies*

There are still places where factory pies are called foundry pies. It is quite possible that you get a firm lower crust at the expense of selling value of all the rest of your pie. It may be that you are figuring to keep your product a half cent under your competitor instead of making it a whole cent better than he does.

There can be no doubt that quality ingredients are essential to quality pies. Substitutes are neither safe nor popular. The best of flour, the best of shortening, fine fruits and careful working are essential. There is some question whether machinery even can fully replace handwork in the preparation of pies. You will have to find that out. If machines do not give you a quality product, throw them out. We have to use human help, not machines, in all our cooking.

I hope I do not have to insist on the highest type of cleanliness. You simply cannot be too careful on this score. Restaurants of the group I represent have accepted cleanliness as the poet says it is, as "next to godliness." When we pass on to our customers a product that comes from outside our own place of business, we want to be sure that the other fellow is as particular as we have to be.

Flavor never can be neglected and here skill must be brought to help out cleanliness and quality in material. Somewhere in your organization there must be some one of taste and experience to see that your output measures up to the exacting requirements of present day appetites.

### *Our Most Popular Dessert*

There is no doubt in the mind of any restaurant operator that pie is America's most popular desert. No restaurant is so small it does not attempt to serve pie. None is so big that it can ignore pie. Pie will range from a small slab cut to sell for a dime; to a generous section for which hotels and some service restaurants get as much as a quarter.

Only a very small fraction of the bread sold in the restaurants of the United States is baked by them. I think this is largely due to the improvement in the quality and variety of breads made by the bakers themselves.

I am quite sure that the pie baking industry does not enjoy at the present moment a similar proportion of the restaurant trade. Whether it ever shall enjoy that percentage, I believe is very largely in your own hands and will depend almost entirely upon your ability to produce an article of character and quality, uniform in its merit, and with sufficient variety to meet a wide range of taste.

All this you must do at a price not higher than the man can do it for himself. You are entitled, however, to find out to what extent those who dispense pies in their places of business are carrying a high element of overhead for the sake of having a quality product.

In the nature of things you ought to be able to produce what the restaurant man wants cheaper than he can produce it for himself. I think you will recognize, however, that the restaurant man is closer to the consuming public than you can be and when he tells you that quality and variety are necessary, he is speaking out of a very definite experience which it has cost him money to get.

You are the makers of the most popular dessert in America. You have a field and opportunity which should challenge the best efforts of intelligent business men. Pie is essentially an American dessert. In the form in which we know it, it is scarcely seen abroad and then only when it has been introduced as an American food and become acclimated.

### *Pie is a Substantial Food*

Your own bureau of research has established long ago a very fine and positive fact that pie properly made is a substantial food. Indeed, you are not manufacturing a knick-knack but are catering to a very definite appetite, and a very large and well-established appetite, and you are providing an article of food which has in a sense passed the experimental stage and which has at once appetite, custom and scientific knowledge to back it up and which is sufficiently ingrained in our national eating habits to give reasonable assurance that it will endure for generations to come.

Let me say that the restaurant industry has every reason to wish you well in any effort to improve the quality and the popularity of pie. It is one of the few dishes which can be served any hour of the twenty-four.

Pie is in every sense a staple in the restaurant industry. It yields a normal rate of profit. In most restaurants it ranks among the best sellers. The items making up material costs do not fluctuate as much as many other articles which are sold in restaurants. Like most other businesses, the restaurants dislike to change prices more than is necessary.

### *Bakers Should Make the Pies*

I think I may add that restaurants are not eager to prepare in their own kitchens items which can be bought in the open market without sacrificing quality and economy. All restaurant men will not agree on these points of quality and economy, for there are some men who make their own catsups and pickles as well as preserves and canned goods. This is not true of the big line of operators. I can see no reason, therefore, why the pie manufacturers of this country cannot hope to supply a large proportion of the total number of pies consumed, if they will meet the conditions I have laid down.

If you are not properly organized, you can learn to organize. If you have not taken advantage of research material, you have only yourself to blame. If the investigations have not been adequate at the present time, I am sure you have the machinery with which to get them.

I am sure that the restaurants of the United States for years to come are going to sell an increasing quality of high-grade pies.

The market is there.

It is up to you to get the business.

With determination, energy, system and organization, you can get it.

## *Planning Dietaries for Children*

"GROWING children need much more food per pound of body weight than do grown people. There are several reasons for this. Children are much more active physically than are adults in ordinary occupations. The body of a child needs not only material for its repair, but building substance for new tissue so that growth may progress normally. The body of a child has much greater surface area per unit of body weight than does that of an adult and, therefore, radiates more heat from its surface, needing more fuel to product this heat.

"Since the stomachs of children are small, their food should be given in small quantities at frequent intervals. A good way is to give them three meals with the family, planning mid-morning and afternoon luncheons as extra feedings. These luncheons served between meals should be carefully designed as part of their day's rations. Simpler articles from the dietary such as milk with bread and butter, or a portion of the fruit content of the plan can be left for these lunches.

"A good way to plan the school box lunch is to give sandwiches, fruit, salad and cookies, depending upon the school for one hot dish, such as vegetable soup, hot cocoa or stew. If the entire lunch is taken from home, remember to make as many changes as possible in the menu used.

"The foods best suited to the school lunch which is packed at home are sandwiches, firm salads, whole fruits and small cakes or cookies. Make sandwiches of different breads, sometimes of white, occasionally of brown, again of raisin. They can nicely be made of buns, cold biscuits or crackers. The varying of breads in sandwiches is as important as the varying of fillings. The fillings should be nutritious and appetizing and interest is added if there are several flavors in each lunch. Cut the bread of uniform thickness, butter it well so that the filling used will not be absorbed by the bread."

—Mildred Chase Cooke
in The Western Dietitian, Sept. 1926.

Better are small morsels of bread in comfort than fat fowls with sorrows.

—Old French Proverb.

## *Six Meals a Day*

NO DEPARTMENT of the modern newspaper is more thoughtfully read than the syndicated articles which discuss food and health problems.

There are two reasons for this keen interest: the desire to know what is good for the health and the quality of the articles which are now being written by authorities on the subjects they discuss.

One of the best of the health columns is edited by Dr. C. A. L. Reed, who after years of successful work in his profession and after his term as president of the American Medical Association decided to continue to serve the public health by translating his wide experience into popular language. In a recent article he says:

"You doubtless, in accordance with American custom, eat only three meals a day.

"In practically all of the European countries the people take the same gross amount of food in five or six installments during the twenty-four hours.

"The European habit, which fortunately has already gained a footing in America, is better than ours for several very cogent reasons.

"We no longer cling to the old idea that mealtime was a function of the calender, like the tides, rising sun, and the full moon.

"Indeed, the 'Fourth Meal at Four' campaign which started on the Pacific Coast is traveling eastward so rapidly that the children who are now learning more in the primary grades because they are being better fed will have acquired a full legal right to rush into the pantry as soon as they get home by the time they are in grammar school—a good habit.

"Those mothers who still think that stomachs automatically open to receive food at 7, 12, 6 o'clock, and that food at any other time, at least for children, is a physiological crime, we are assured by Baking Technology, would have a most upsetting experience if they visited Oxford University.

"There is the story of a recent visitor at that ancient college who found the formula of living there very different from our own.

"There are six opportunities at Oxford for eating.

"Breakfast consists usually of porridge, fish, bacon, toast, quantities of marmalade and tea—much different from the roll and coffee in France.

"Eleven o'clock is the time for coffee and wafers. This custom started in the war period and, of course, is much frowned on by the authorities, for it breaks into a morning's work. But there are inviting coffee shops that have real American jazz, which induces one to linger.

"One o'clock is the lunch hour.

"At 4 o'clock is the long-established and invariable English tea.

"The 7 o'clock dinner is the really substantial meal of the day.

"Between 10 and 12 p. m. there is very often a hot drink, usually a mild cocoa, the heat of which conduces to sleep.

"This schedule of food-taking tends to prevent under-hunger, with consequent gorging. It prevents the prostration of the digestive apparatus by overworking it. It saves the pancreatic function by not overloading it at any one time by starches and sugars, and this tends to prevent diabetes. It naturally carries with it a brief rest period, which tends to neutralize the pernicious effect of the American vice of industry."

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There is no better bread than that which one shares with the poor.

—Dutch Proverb.

## *Bread and the Reducing Diet*

DR. W. D. SANSUM in an article entitled "Safe Reducing Diets" which appeared in a recent number of The Western Dietitian, brings out some facts to which attention is seldom called:

"Contrary to the popular belief, reducing diets must contain ample starches and sugars. In general, fats cannot burn properly in the body except in the fire of burning sugar... If the obese person starves or eliminates the starches and sugars from the diet, the chief source of heat and energy is his own body fat. Since sugars are not eaten, this body fat is improperly burned and the patient will inevitably suffer from the dangerous type of acidosis. Experiments show conclusively that this acidosis results unless the reducing diet contains at least one part of starch and sugar for each part of fat in the diet and for each part of fat lost as reduced body weight. For each pound of weight lost, the patient must eat at least one pound of starch and sugar...."

This will no doubt be a surprise to those people who have the mistaken idea that bread should be excluded from reducing diets. Although it is well known that fat can not be digested normally except in the presence of carbohydrates, it is not so well known perhaps that body fat can not be consumed without their presence. Taking everything into consideration, bread is well adapted for the diet of those who are reducing. It is not a concentrated carbohydrate but contains a considerable percentage of proteins which is as necessary for those who are reducing as for those who are not. We must have proteins and carbohydrates in either case and bread furnishes both in the most easily and completely digestible, as well as least expensive form.

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**Happy are they who find their bread already baked.** —**Old Scotch Proverb.**

## *Danger for Generations Ahead*

"THE deliberate under feeding by girls and young women for the purpose of acquiring the longed-for slender and boyish figure is becoming a menace not only to the present, but also to future generations", says Doctor Woods Hutchinson in his excellent article on Fat and Fashion in a recent number of The Saturday Evening Post.

"Both boys and girls need a comfortable padding and lining with fat for the same storage, lubricant and shock-absorbing purposes as do adults; and, in addition, a special margin of adipose as one to grow on, like the extra slap on the back when wishing them many happy returns of a birthday.

Leading directors of physical education declare that from their medical experience they are convinced that underweight is a distinct health handicap for growing youths. And that when a young woman appears for the physical examination required before entering college and is shown below par in health and vigor it is found in many cases that this is the result of deliberate and intentional weight reduction.

While the superintendent of a New England hospital raises the warning that 'the desire to be thin is an obsession of the female of the species from sixteen to sixty,' and from her experience the craze for a boyish figure is responsible for many cases of mental breakdown in young women. 'Growing girls need all the nourishment they can consume at regular intervals three times a day. This means that a girl needs good food in normal quantities until she is at least twenty-four years old, and especially from twelve to twenty. Girls are starving themselves, not dieting, when they unintelligently go without their breakfasts, cut down on their luncheons and eat sparingly at dinner.' "

# Books for the Baking Laboratory

RIGHT FOOD, THE RIGHT REMEDY. By Charles C. Froude, B. Sc. With an Introduction by Royal S. Copeland, A.M., M.D. Brentano's, N. Y., n. d.

Dr. Copeland evidently likes this book for he writes in his introduction to it: "In my judgment this book is worthy the study of everybody." Egged on by Dr. Copeland's injunction, the reviewer as a constituent of everybody, waded through the three hundred and six pages of this three dollar volume with mingled feelings of wonder and sorrow.

We do not agree with Dr. Copeland, for in our humble opinion this surprising mixture of truth and fiction is of little significance for a better understanding of foods and nutrition. There are so many good books on the subject of nutrition by recognized authorities that it is surprising to find "Right Food—the Right Remedy," taken seriously by anyone.

Not being written exactly on the basis of published references to the literature many statements seem to have sprung full born from the head of the author so that it is quite impossible to determine the responsibility for the original sources of some of his notions.

On page 55, the author states, "Many of the more hearty or staple foods—such as meat, eggs, bread and the legumes—often decompose before they can be digested, due to their deficiency in food salts, the salts which are antiseptic or antifermentic." This is a statement which cannot be substantiated. There is nothing inherent in these products which will produce decomposition before salivary, gastric or intestinal digestion. The contents of what the author terms "food salts" have nothing to do with the prevention of decomposition. Decomposition in the sense that the writer uses it, is generally involved with bacterial infections. Infected and decomposed meat, eggs, bread or legumes are not commonly eaten. Even high game is supposed to be cooked.

On page 56, "If we do not eat raw fruits or raw vegetables with a meal the staple foods tend to decompose and ferment." This is another unsubstantiated statement, and the author is probably thinking of something else, though what, is not apparent.

Examples of confusing and unfounded opinion and statement could be multiplied, but this book should not be taken seriously. It is a food crank's vade mecum and all the weird notions find a place here from the "sixteen elements" to acidosis.

In conclusion, however, we cannot refrain from quoting the statement on page 111 that, "A piece of bread and butter will not be digested if enough heat is supplied by the sugar." "Nature—digestion will not work on bread and butter when it has sugar—when it can get the required heat and energy from the sugar without effort." The reviewer will bet Mr. Charles C. Froude, B.Sc., a nickel or anything else as valuable that a slice of bread and butter with sugar on it will be digested without difficulty by the average healthy stomach and that energy will be furnished by the constituent protein, carbohydrate and fat.

This is one of the most silly and inconsequential books on foods that we have ever read, and how it ever was passed by a publisher's reader can only be solved by unscrewing the unscrutable.

C. B. Morison.

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## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**An improved method for the preparation of wheat gliadin.** M. J. Blish and R. M. Sandstedt. Cereal Chemistry 3, 144 (1926).—When crude gluten has been dried in vacuo at 65° to 70°, is ground to a powder and treated with 0.01 N to 0.1 N acetic acid only gliadin is dispersed. The extract may be filtered water-clear, and the gliadin recovered by the addition of salt, or by neutralization with alkali. This furnishes a basis for preparing gliadin in quantity and of a high degree of purity. It is superior to the established method from the standpoint of economy (in time, expense and alcohol) and simplicity of operations.

L. H. Bailey.

**Flour suitable for baking.** S. Camilla. Giorn. chim. farm. 75, 107-12 (1926).—In order to be suitable for baking, especially with "artificial" pressed yeast, flour must have a glutenin content of 12% (dry) whereby the proportion of gliadin to glutenin must be 3:1. The deterioration of flour is prevented by proper conditioning under a constant elevated temperature which permits the evaporation of the excess water.

Mary Jacobsen.

**Relation of protein content to baking quality of flour from hard red spring and durum wheats.** C. E. Mangels. Cereal Chemistry 3, 150 (1926); cf. C. A. 19, 1913.—A significant positive correlation was found between protein content and baking strength of hard red spring wheat flour (as measured by loaf volume), for 8 of 11 crop years. The magnitude of the coefficient of correlation indicates that protein content is not the sole factor which determines baking strength of hard red spring wheat flours; the quality of the gluten and the diastatic activity of the flour also are important factors. Durum wheat flours consistently average lower in loaf volume than hard red spring wheat flours. A positive correlation greater than 0.300 was found between protein content and baking strength of durum wheat flours (as measured by loaf volume) for 6 of 10 crop years. The relatively low baking quality of durum wheats is evidently due to poor quality of gluten.

L. H. Bailey.

**The gasoline color value of several classes of wheat.** D. A. Coleman and Alfred Christie. Cereal Chemistry, 3, 188 (1926).—A study was made of the pigments found in wheat and wheat flours which are soluble in gasoline. The largest amount 2.40 was found in a sample of hard white wheat, the lowest 0.64 in a sample of soft red winter wheat. On the average, the wheats of the hard red winter class contained the largest quantity of gasoline-soluble pigments, the next greatest amount being found in the common white class of wheat. It was surprising to note that the durum wheat averaged lower in gasoline-soluble pigments than the wheats of the classes mentioned, as durum wheats are usually associated with high color. Certain varieties of durum wheat are consistently lower in gasoline-soluble pigments than others. The varieties Arnautka, Kubanka, Kahla and Mindum contain large quantities of these pigments, whereas the varieties Acme, Monad and Pentad contain low amounts of these pigments. No relationship was found between the protein and ash content of durum wheat flour (straight grade) and the gasoline-soluble pigments. The gasoline color test can be applied to the wheats as successfully as to the flours. L. H. Bailey.

**Biological value of bread-protein.** M. Hindhede. Biochem. J. 20, 330-4 (1926).—A criticism of Martin's and Robison's work (C. A. 16, 2885) who found that the protein of bread has a value of only 30-35% as compared to animal protein, whereas H. (C. A. 7, 3994; 8, 3576) found the protein of bread to be of full value. "Not till Martin and Robison have, for a couple of months, tried a diet containing only about 3.5 grams digestible bread-N, besides sufficient calories, vitamins and salts—not till then have they furnished the proof of the small value of bread-protein."

Benjamin Harrow.

**The influence of the mineral constituents of food on animal health.** Max Henry. Agr. Gaz. N. S. Wales 36, 888-94 (1925).—A correlation of published data on the subject. A bibliography of 22 references is appended.

K. D. Jacob.

**A new factor for converting the percentage of nitrogen in wheat into that of protein.** D. B. Jones. Cereal Chemistry 3, 194 (1926).—The conversion factors for the normal in the 3 parts of the kernel are bran 6.31, endosperm 5.70, embryo 5.80. By basing the calculation on the percentages of normal in the individual proteins of the endosperm, embryo, and bran, and on the relative proportions in which these proteins are present, the conversion factor 5.83 is obtained for the normal of the whole kernel instead of 5.7, the factor generally used.

L. H. Bailey.

**The nutritive value of various layers of the wheat and corn kernel.** A. Klein, B. Harrow, L. Pine and C. Funk. Am. J. Physiol. 76, 237-46 (1926)—Using Mitchell's method for the determination of the biological value of proteins, the authors found considerable difference in the protein values for the various layers of the grain. In general the fractions which contain the pericarp and the germ possess a much higher nutritive value for rats than fractions which are composed mainly of the endosperm. Whether this superiority depends on differences in vitamins or on a superior protein content can not be decided.

J. F. Lyman.

**Bread.** C. Hoffman. U. S. 1,579,447, April 6. In forming leavened bread, a substantial quantity of pasteurized inactive yeast with the cell walls unruptured is used as an ingredient to augment the vitamins and other nutritive properties of the bread.

**Bread.** H. M. Heimerdinger. U. S. 1,580,487, April 13. A cooked and dried potato pulp containing altered starch, proteins and $H_2O$ (but capable of absorbing a large quantity of additional $H_2O$) is used as an ingredient of bread dough.

## *Club Women Resolve Not to Diet*

"OUR friends, the American Institute of Baking, in Chicago, who do us the our pages, brought to our attention some our pages, brought toour attention some time ago a most interesting and courageous resolution adopted by the General Federation of Women's Clubs. Instinct of some kind bade us lay this information aside during the summer, and now we feel the time is ripe to bring it forth, for are not the most distinguished club women in New York State now daily informing our readers through these very columns, of new and exciting recipes and frank and candid reactions of busy club women to home life?

"The resolution which we so greatly admire is that American women be urged not to employ ill-advised diets and radical starvation rations in order to bring themselves down to below-normal weight for the sake of being fashionable. The information which came to us read, in part, 'The desire for slim figures has turned the feminine population away from bread to grape-fruit and spinach.' This, of course, from Baking Technology, the official organ of the American Institute of Baking. But the information, as reported in in that organ, goes on to discuss, not only the decreased consumption of bread flours, but the measures taken to discourage unwise and dangerous methods of reducing weight.

"Such a resolution, passed by such a representative group of active, competent, accomplished women—not to imperil the health of present and future generations because of a passing fashion in figures—we hope will mean a discontinuance of such dangerous practices. Three million women gave their word that they are opposed to thin figures as against proper nourishment. Who'll follow the leader?" —"Suzanne," in N. Y. Telegram.

## *The Stone Bread of Persia*

ONE day, in Teheran, I was walking with a nurse from the dispensary, and we smelled fresh bread. I had always wanted to see how Persian bread was baked, so I said, "Let's go in." We found the bakery very entertaining. There is a book called Hadji Baba of Ispahan which speaks of "flaps of bread," and that is a good description. The oddly shaped loaves are almost a foot wide and nearly three feet long, flat and somewhat irregular. The bread is also called "stone bread," and it is baked on the small gray stones of the oven floor, under which is the fire. Often there are little stones embedded in the bread, which make it hard on the teeth. There was no door to the oven we saw, and a man was spreading flaps of soft pasty dough on a long-handled spade which was propped on a frame. Another man, using a sort of pitchfork, was taking out the flaps already baked on the hot stone floor. The man with the spade then pushed it into the oven and gave it a sort of flip and fling which sent the pieces of dough to the oven floor in the proper shape and size. The bakers laughed to think that foreigners should want to see such a simple thing, but we found the skill of the man with the spade quite wonderful.

Persian bread is useful as well as filling. Men and women carry it rolled up on their heads, in wet weather spread out to keep off the rain, in sunny weather to protect them from the sun; they hang it over the arm or the shoulder, or roll it in a bundle under the arm. It is hung up at home, to be eaten later, plain or toasted. At the hospital the servants used to spread their Sunday supply to dry on the quilts of unused beds, first making sure that the doctor's rounds had been made.

—From Atlantic Monthly, Oct. 1926.

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# The Need of Knowledge

## *The New Science of Nutrition Must Be Carried into the Hospitals*

By Dr. H. E. Barnard*

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ALL through the centuries the successful man, whether the tribal leader of a people still living in the jungle, the organizer of some great crusade of the middle ages, or the creator of a vast modern industry, has been a man of vigor and endurance. Back of an active brain which plans must be a strong body to execute the will. The measure of fitness to do work and stamina to carry the burden to the journey's end is in the final analysis determined by adequate nutrition. Undernourished bodies cannot be temples of brilliant minds. No malnourished people can ever rise high in the scale of civilization. The occasional exception to the rule sometimes noted in the case of men who have gone far in spite of physical handicaps does not weaken the validity of these assertions. It proves rather the power of the individual to rise above the common level, and the biologist will find a reason for the triumph in some unusually active glandular function.

The food supply is therefore a most important essential to racial and individual progress. Yet the science of eating has until recently been hardly more than a traditional inheritance. We eat beans in

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*An address before the American Hospital Association.

Boston because our forefathers did. We live on turnip greens, sow belly and corn bread in the South because those foods have proven their ability to nourish a hardy people.

If we are Esquimaux we are happy before a dish of seal blubber, and on tropic islands the fruit of a coconut palm is a whole meal.

### *Nutrition is an Unappreciated Science*

There are, of course, many schools of dietary habits which can find no health in such diets. The cult of the rational life, if there is such a cult, would no doubt condemn the Esquimaux diet because it was wholly animal instead of entirely vegetable. Advocates of a high protein diet would have little interest in the product of the breadfruit tree. And so it goes. Next to the science of healing the ills of mankind, the least organized and appreciated science is that of nutrition.

It is proper, therefore, to bring before this group of technical workers in that important field of endeavor which repairs the ravages of disease or the results of accidental upsets of normal life some of the newer facts of nutrition as they relate both to the removal of pathological conditions and the proper foods for healthy men and women.

But before we can even begin a discussion of nutrition, is it not advisable to define our subject? Is nutrition the hodgepodge of fats, carbohydrates, proteins and mineral salts served to us ten, twenty or thirty years ago by some textbook lecturer, or is it the science of the chemistry of our body cells? Far too frequently I fear nutrition as taught is but a miscellaneous assortment of empirical rules, set down in the form of "thou shalt nots" to guide us on the pathway to health and efficiency. The real science of nutrition has progressed beyond the stage where assertions are facts, and dietaries are now based on proven knowledge rather than on ancient notions.

### *The Measurement of Food Values*

More than thirty years ago, Atwater, one of the first American investigators, did much valuable work in determining the composition of foods and in observing how foods were assimilated and converted into muscular energy, body heat and new tissue. He developed the calorimeter in which human subjects ate and worked and lived while their bodily reactions were accurately observed. But while Atwater's work was most important and while it fixed the value of the calory in estimating food efficiency, it was but the beginning of the splendid work which has been done in the research laboratories in more recent years. Atwater measured food values by the heat released during the oxidation of fat, protein and carbohydrates. He set up standard food intakes for men and women at hard work and easy work, for lumbermen and bookkeepers, for housekeepers and school children.

Voit had done the same thing in Germany, Chittenden was beginning it at Yale and so the schools of a few decades ago took this new knowledge and translated it into assimilable form for their students. The work was good. Food as fuel kept the health fires burning. But it was not the whole story. There is more to food than calories, and more chemistry in metabolism than the burning of fat to maintain bodily warmth in winter weather.

While Atwater worked with his calorimeters, Osborne and his colleagues studied proteins and found that while proteins were important constituents of most foods the quality of the protein varied quite as much as the quantity present. And so it became apparent that it was the kind of protein as well as the amount which determined the adequacy of a high protein food.

A little later McCollum, working on animal nutrition, noted that all fats were not equally good food and that butter fat contained something that vegetable oils or fats lacked. Soon other investigators reported finding hitherto unknown substances in food which were never apparently of great importance in nutrition. Funk called these substances vitamins. And we woke to find we had entered a new world of nutrition.

### *The Progress is Amazing*

In ten years in which the vitamin potency of foods has been studied, amazing progress has been made both in isolating many different vitamins and in determining their value in nutrition. Thousands of chemists, investigators, nutrition experts, are studying vitamins. Every day a new discovery is announced or an earlier recorded fact set aside as inadequate or incorrect. And the end is not even in prophetic sight.

Even the wisest scientist working in this new field of food and nutrition will hesitate to lay down definite rules for eating. A few things do seem clearly proven. Growing children need the vitamins of milk. Fat Soluble ''A'' may be the thing in butter or cream which is the growth promoting substance. There may be some other factor necessary as well. But the exact nature of the marvelous substance in butter fat which even in minute quantities so influence growth and health need not be known. Some day it may be. In the meantime the use of milk is increasing rapidly and millions of children are the better nourished because of it.

Some centuries ago when chemists first searched out the mysteries of matter they found that bones and teeth contained large amounts of mineral matter which was not consumed by fire. That mineral substance or ash was largely calcium and phosphorus. And it was as easy as it was natural to reason that the building of bone and tooth structure was determined by the nature of the materials used as food. Foods rich in lime and phosphates made strong bone, it was observed. And conversely foods which did not contain an abundance of these elements were set down as inadequate foods.

### *The Chemistry of Man*

In the course of time the dental profession and the medical profession as well began to think of body building foods in terms of their mineral constituents. Some hard working chemist assayed a human body and when he summed up his totals he found that man was a chemical compound made up of carbon, hydrogen, oxygen, nitrogen, iron, calcium, potassium phosphorus, silicon, fluorine and many other elements. And with this table of contents before him, it was as easy as it was natural to deduce the fact that since the body is but the sum total of the food which made it a food supply which does not furnish the chemicals required to build a sturdy framework and clothe it with living flesh, is inadequate and unfit.

Then came the deluge. Our teeth decayed as the doctrinaires so gravely announced, because our food contained too little lime, our legs bowed from the same cause, every form of disease crept upon us because we were eating foods low in iron, in iodine, in one or many or all of the vital elements of normal life.

And another group of investigators, sorting out their food tables, noticed that some foods had an acid reaction while others were basic. They arranged them accordingly and hung above each table the warning signs, ''thou shalt'' and ''thou shalt not.''

Tomorrow some other obvious fact about our food will be separated from its fellows, driven in to a corner, tight-walled against the entry of common sense, and another food cult will spring into being, convinced that its teachings, and they alone, will save the long suffering world from its dietetic ills.

### *Some Theories are Partly True*

Of course, there is truth in all of the theories which have been so interwoven into our nutritional life that it takes courage to approach a dinner table after reading the dietetic advice printed in newspaper columns or listening to a fervid oration on the virtues of raw carrots in delaying the advance of old age.

There are elements of truth in all the theories. But the sound scientific work of the hundreds of real chemists and biologists is taken at no greater value than the amazing nonsense hashed together by self-appointed apostles of the biologic life. Lime is necessary to sound tooth structure, but more than lime must be provided in order that lime is utilized. Eating chalk will not insure sound teeth to an unborn baby. But it seems more and more certain that the use of foods which are rich in lime and at the same time the use of vitamin-potent foods will equip the developing unborn child with such strong rudimentary teeth that in later years he will have prefect teeth.

And in the same way most of the observations of the large group which would make life a nightmare of raw foods or meatless meals, may be taken to pieces and reorganized on a sound basis of scientific fact. The fact that the body is composed of 17 or 70 chemical elements is no reason why our breakfasts should always be grapefruit instead of cantaloupe because it is rich in iron. Nor is the high vitamin content of cabbages any sound argument for our cultivating the dietary habits of a guinea pig.

### *Old Dietaries Must Be Revised*

Through many years of careful supervision of the food supply of hospital patients, certain definite dietetic rules have been set up. Many of the standard diets have behind them the sound observation of hundreds of trained dietitians. But in the light of our present knowledge that we really know little about the chemistry of nutrition and our growing fear that many of the things we know are untrue, is it not time to revise our dietaries, not that they may be wrong but rather that perhaps they might be made less inflexible?

It is but a few years ago that starch or sugar was impossible in the food of a diabetic. What is the practice today? Which of us is to determine whether a low or high protein diet is most desirable? What dietition whose knowledge of foods is modern rather than that of the literature of even five years ago will insist that whole wheat bread is the only good bread for her patients? And who among you would throw the first stone at a piece of good apple pie or a slice of simple cake as a suitable food for grammar school Johnny?

Mother Nature led us by the hand through countless generations. In the last few years we have come to doubt the wisdom of the instinct which brought us so well through all our changes from the one celled atom buried in primordial ooze to the splendid human beings who so fiercely denied the Darwinian Doctrine in a Tennessee courtroom. Is this wise? Is it not better, perhaps, to seek to interpret it more adequately? In the words of Dr. Lafayette B. Mendel, "the science of nutrition is in the midst of a continual evolution of facts and development of truth. For the present, therefore, we should 'first get the facts.' "

## *Raw Foods or Cooked*

ONCE we used to say that we baked and boiled and fried, toasted and heated and reheated foods of all kinds so as to make them more digestible. Then new discoveries about the value of certain uncooked foods came to light and put all our old ideals into a cocked hat. We were told that we should eat our vegetables—our cabbage and carrots—raw, for cooking destroyed some of the precious elements which made them so vital to health. Now new discoveries are announced daily, while we flounder in confusion between the raw and the cooked, not knowing which is better for us. Some of our problems are being rapidly solved, and meanwhile a number of our oldest food theories are being seen in a different light, interesting to all whose concern is feeding a family.

### *The Cooking of Starch*

Once we used to say that all starchy foods required thorough cooking in order to be digested. We neglected to seek for the deeper truth that all starchy foods required long, slow cooking at a low temperature. This fact was discovered when experiments with oatmeal showed the cereal was just as digestible after one hour's slow cooking as after an all night cooking, such as is usually given it. Thus our cooking time for such cereals has been cut to a fraction of its former length, the shorter cooking giving the flavor and texture which we like and proving just as satisfactory as a means of preparing the food for safe eating.

Bread, another starchy food common to our tables, was felt to be more digestible when toasted. The action of the heating upon the starch served to start digestion before the toast was eaten, but we were inclined to think that the effect of the heat upon the protein in the bread was unfavorable. Now we have learned that the proteins of toast and untoasted bread are equally easy of digestion by the normal person, and the predigestion of the starch in the toast rather recommends it in place of bread.

And, among toasts, dry toast is more to be desired than soft toast, since it requires slower and more thorough chewing.

### *What About Quick Breads?*

We have always supposed we must not give hot bread and quick breads to children, that pancakes and biscuits and pie crust were bad for them. But our own government is now announcing in its bulletins that wheat flour has been found thoroughly digestible, whether eaten in rolls, bread, cookies, doughnuts or any other kind of bakery product, and has not been found to have unfavorable effect upon grownup, healthy subjects who joined in an experiment.

And as for fried foods! Horrors! The old idea was that foods which were put into fat to fry soaked up a quantity of the fat and became soggy and most indigestible, which is not entirely untrue when the cook lacks skill. But we also felt an importance was attached to how much fat was used in preparing a fried dish, and favored the one in which the least fat was used, turning our backs upon the other. We are still agreed that any food or article of food coated in fat takes some length of time to digest, but ordinary fried foods, well prepared, need not be excluded from the diet of any healthy adult person. New York Telegram Food Bureau.

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Lieutenant Thoret flew over Mont Blanc four times yesterday dropping packets containing commodities. Most welcome was a sack of fresh bread for the scientists and guides working at the observatory on the summit. It was the first time in alpine history that fresh bread was tasted on Mont Blanc; also the first time a party has stayed on Mont Blanc as long as nine days.

—The New York Times.

BAKING TECHNOLOGY

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H. E. BARNARD, Editor

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### *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *He Never Learned the Game*

FOR thirty-five years Hans watched Carl and Oscar play chess at the village inn. In winter he stood first over Carl's shoulder and then over Oscar's, watching the wooden pawns and nobility do their slow and cautious moving over the checkered board, and in summer he took up his position back of one of the high-back chairs in the hop-arched walk and watched the players. For 35 years he watched and smoked in stolid silence while the heads before him changed from black to gray, and to white.

One night Carl came toddling down and sat up the men in their places and waited for Oscar, impatiently consulting an enormous silver watch as he waited. Finally a pantalooned chap came running with a message: "Grandad says he's sorry he's sick and to tell you he won't be able to come down tonight." Carl tapped the flags with his stick. "Sick? Preposterous! Why, that would mean no chess tonight." But with a happy thought he turned to Hans. "Oscar sends word he's sick and won't be able to come down tonight. Sit down and play a game with me."

Hans paused to tamp down carefully the ashes in his pipe, then looking at Carl, "Sorry," he said at last, "but I never learned the game."

How many lifetimes are wasted looking over someone's shoulder, never learning, never preparing to slip into the seat vacated by some player who can no longer move men in the game of life? The unknown teller of this simple story has given us the reason for most of the failures to reach success. If we are content to watch the players can we complain if we never know the joy of participating in the contest?

# *Man Power*

WALTER DILL SCOTT, President of Northwestern University has given us a new way of looking at modern machinery and the responsibility it places upon us. He adds up the windmills, half million tractors, seventy thousand locomotives, fifteen million automobiles, the ships, mills, electric and water power, and the rest of it and finds that every one of us has over six horse power at his command. Carrying the study further, he found that this six horse-power would require the hard labor of just two hundred and fifty men to perform equal tasks.

Two hundred and fifty man-power captained by each of us! Two generations ago the landholder who controlled that many slaves was rich. Today the owner of a bakery is the general in command of two hundred and fifty slave-power for every man in his employ. Every employe in turn is captain of a whole company of productive power.

The training of this man-power then is the most important responsibility in the hands of the employer. The late John G. Shedd, who started with the old Leiter-Field organization as an errand boy at a dollar and a half a week was a developer of man-power. The Marshall-Field stores, the greatest mercantile organization in the world, is a monument to his interest in the employe's ability to grow. Whether as department foreman, general manager, or chairman of the board, he never missed an opportunity to talk to, teach and train anyone in his institution who showed an interest in his work.

The lasting successes in the baking industry will likewise be those organizations who accept the responsibility of training to the fullest extent the man-power under their direction. L. A. R.

## *Avoid Fads*

ALL the lunatics are not in the insane asylum. It has been said that everyone is a little "off" on some point, and it is only a question of degree that keeps our public institutions from being crowded to their utmost capacity. This seems to be an age of fads, and people are running about with all kinds of notions, from eating sawdust down to going barefoot for health. One has only to look at the multiplication of religious sects, and read some of the ridiculous tenets and claims put forth by some of them, to realize the riot which human thought has reached. The hunt for "something new" has a great fascination for some people who run after every new fad in business, science or religion. The man who starts fad chasing is on dangerous ground. Not one in a thousand of those who get the habit ever amounts to shucks. Nearly four thousand years ago the warning was sounded, "He that tilleth his land shall have plenty of bread; but he that followeth after vain pursuits shall have poverty enough."

## *An Honored Baker*

THE baking industry is many-sided. Often bakers expand the outlet for their products by opening restaurants and lunch-rooms. They operate baked bean parlors in New England, or doughnut shops in the northwest, and roadside stands feed thousands of wayfarers on frankfurter sandwiches and pie. While the production of baked goods is a very different thing from serving them there are so many ways by which the baker and restaurateur can work together to mutual advantage that both may profitably study the other's industry.

Many bakers have become successful restaurateurs and often the restaurant develops into a retail bakery. A prominent member of American Bakers Association, Percy A. Brown, of Wilkes-Barre, Pa., has been notably successful as a restaurateur. He has given freely of his time to building a strong, nation-wide organization of restaurant men, and at the recent meeting of the National Restaurant Association he was elected first vice-president of that influential body.

It may easily be surmised that Brown the Baker, and Brown the restaurateur, in their mutual efforts find many ways by which to serve more toast and less sloppy breakfast foods to early morning patrons, more bread and pie and cake at the lunch hour, and more baked products of every description to dinner guests.

There is no falling off in the use of baked products in the Brown restaurants. His baker brethren wish Vice-president Brown much success in the work they know he will do for his great organization. And they express the hope that through him the common interest of baker and restaurateur in the production of better food and its more intelligent use in feeding the human family may be emphasized and developed.

# The Cooling of Bread

## *Comparative Study of Shop Cooling and Controlled Cooling*

By I. A. Berg
***American Institute of Baking***

### PART IV.

IT WAS observed from the experimental work that low temperature cooling showed many advantages. The next step was to determine whether these advantages were realized on a large scale.

For this purpose a well insulated compartment was constructed large enough to hold two racks of bread. Air was uniformly supplied to the compartment through a system of ducts by an air cooling machine manufactured by the Ekco Engineering Company and ordinarily used to operate with high speed mixers where cooling is necessary to overcome excessive heating of doughs. The machine uses water or brine for lowering the air temperature and is of compact construction. The lowest average temperature maintained in the compartment by the machine when using city water at a temperature of 49° F. during the cooling of bread was approximately 67° F. Using brine at a temperature of 10° F. it was possible to maintain an average temperature of 45° F. In the center of the compartment the wet and dry bulbs of a Brown recording hygrometer were suspended for temperature and humidity observations.

### *How the Bread was Handled*

After a few preliminary trials in both the cooler and shop it was found that six trays of bread, each holding 35 one pound loaves, were a sufficient number of loaves from which data could be obtained on which to base conclusions for large scale cooling. The time required to make the required observations of temperature of bread, the weight of the tray, and placing in the cooler or on a rack in the shop from the time the bread left the oven was usually less than a minute and never more. Allowing for unavoidable halts between trays the total time required was about fourteen minutes and sometimes less for all trays.

In order to avoid variable factors such as baking or consistency of the dough and to insure comparable information for one test, care was taken that bread placed in the cooler and on the rack were from the same dough and baked under the same conditions. Since the bread was taken from a traveling oven this was readily done by watching marked loaves and taking the bread in the order it came out.

In table 7 is presented the compiled data of four comparable observations, each of which were made on different days. It is seen from column 3 that it required only 49 minutes for bread to cool to an average temperature of 95.4° F. in an atmosphere of 44.3° F. and that the evaporation loss was 1.74 per cent. The same bread cooling for 128 minutes in the shop at an average temperature of 83.2° F. to 84.1° F. lost 3.48 per cent. Since bread is often allowed to cool for two hours it is readily seen that by cooling in a definite manner at low temperatures there is a saving of 1.7 per cent.

In table 7, column 4, under Shop, it will be found that it takes bread about 90 minutes with a loss of over 3 per cent to cool to 95° F. That the loss may be well over 3 per cent in 90 minutes is shown by columns 1 and 2 where the bread lost 3.3 per cent in 75 minutes and 3.38 in 65 minutes. Referring back to table 4,

TABLE 7

Comparable Evaporation Losses in Large Cooler and Shop

| | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|
| | Shop | Cooler | Shop | Cooler | Shop | Cooler | Shop | Cooler |
| Average Temp. of Bread on to Tray—° F. | 200.5 | 203 | 201 | 202 | 202 | 202.5 | 198 | 204.3 |
| Time Cooled—Mins. | 75 | 65 | 65 | 64 | 128 | 49 | 101 | 61.8 |
| Average Surrounding Temp.—° F. | 86 | 46 | 85 | 43.4 | 83.2 | 44.3 | 84.5 | 66.8 |
| Average Per Cent Relative Humidity | 44 | 70 | 49 | 83.5 | 51.8 | 71.8 | 49.8 | 81.7 |
| Average Temperature of Bread after Cooling—° F. | 101.6 | 84.3 | 106.6 | 84 | 84.1 | 95.4 | 90 | 101 |
| Average Weight Loss During Cooling—Per Cent | 3.3 | 2.0 | 3.38 | 2.19 | 3.48 | 1.74 | 3.25 | 2.50 |

(Part II) it will be found that the average loss in two hours of bread cooling on racks is 3.79 per cent for six observations. The difference here between controlled low temperature cooling and shop cooling for two hours would be 2.05 per cent with a saving of 70 minutes in time. The average temperature of the six observations recorded in table 4 is 87.6° F.

### *Cooling at Low Temperatures*

It appears from these observations that bread will take about 90 minutes to cool to 95° F. with a loss of about 3.4 per cent, since the average one hour loss for the six observations was 3.148 per cent.

All the observations were made during winter months when the shop temperatures had a minimum average of 81.3° F. and a maximum average of 86° F. In summer months where the temperatures are much higher and bread is allowed to cool at least two hours and often three hours the evaporation losses would be obviously higher and still greater saving would be possible by controlled low temperature cooling. It appears from the data and the deductions which have been made that a saving of 1.7 per cent is a modest figure when bread is cooled for 50 minutes at about 45° F. Allowing a determined oven loss of 10 per cent we find that a saving of 1.7 per cent bread is equivalent to a saving of 1.53 per cent of dough weight.

Several loaves of bread were wrapped from those that were cooled in the cooler and those cooled in the shop. These loaves were placed under code and then examined the following day by the superintendent of the bakery, the owner and a salesman, for flavor, taste, texture and character of crust. There were but slight differences in opinion among the judges and the loaves cooled in the cooler at low temperatures were always selected as possessing the better characteristics. Another point noticed was that the bread from the cooler felt softer through the wrapper.

The results of this study of bread cooling also brings out the fact that low temperature cooling will make it possible to construct smaller bread cooling conveyors.

### *Summary*

The importance of bread cooling was discussed in Part I, with a study of the factors involved, the temperature of bread from the oven, evaporation during cooling, the theory of evaporation and the sanitary factors during cooling. It was also stated that no definite information was available as to the optimum conditions of bread cooling.

Part II presented the study of the methods of cooling in large bakeries on the conveyors and on racks with respect to rate of cooling and loss due to evaporation. It was shown that the cooling of bread under the shop conditions noted required an undue expenditure of time and was attended by appreciable losses in weight of the loaf.

Part III presented the experimental study of cooling bread in different atmospheres. The experimental work indicated that cooling bread at low temperatures showed advantages in saving time, weight of the loaf and the quality of the bread.

In Part IV the results of a comparative study of shop cooling and controlled cooling on a large scale was presented. The results of this study again indicated the advantages of low temperature cooling over ordinary shop cooling methods.

### *Acknowledgment*

The writer wishes to express his appreciation of the interest of Mr. J. M. Livingston in providing facilities for this investigation and also to Mr. J. Kohlman for personal assistance in connection with the shop experiments.

## *Fatness and Fitness*

IT may surprise some people to know that all age groups in both sexes are showing a marked decline in tuberculosis death rate, save one. The group to which young women and adolescent girls belong shows a slightly increasing rate as compared with the rates of a few years back.

Several reasons for this condition are set forth. One of the commonest is that scanty dress is responsible. We doubt it, however, since one of the most effective ways of treating and preventing tuberculosis is by exposure of the body to cold air—and sunlight—with little or no clothing.

It is more likely that the reason lies in a large part, at least, in the scanty diet of girls who are willing to go to any extreme to remain thin or become thin. The ideal type of girl from the standpoint of fashion is far too thin to satisfy the requirements of the hygienists. Many women and not a few men are injuring themselves to attain fashionable silhouettes.

We do not defend the soft, flabby flesh of the person who eats too much and works too little. That kind of fat is a nuisance and a burden, which shortens life and hinders efficiency. But fat that is the result of proper eating and good health, and which is able to stick on during normal muscular exercise, should be regarded as an asset—money in the bank which can be drawn on in time of need.

Any prediction concerning the trend of fashion is a risky undertaking for mere man, but we will guess that a return to fuller figures will take place in the rather near future. It will certainly be in the interest of health as has been the general trend of fashion for the last half century.

—Thurman B. Rice, M. D.

## *A Novel Use for Dough*

WE are apt to think of dough solely as a step in the process of making bread. It probably will be new to some of us that this same dough plays a part in the manufacture of watches. Many of the finer parts such as the screws and rivets are so small that they can not be handled with the fingers and not easily with forceps. It has long been the custom in the manufacture of watches for those having to make the inspection of the finer parts to have a small piece of dough at hand. By touching the finer parts with the dough it is very easy to pick them up, and they can be examined with the magnifying glass.

One factory turning out from two to three thousand watches per week uses two barrels of flour during that period. Figuring this flour to the bread basis each watch requires a quarter of a pound of bread.

# Round Table Conventions

By WASHINGTON PLATT

*Allied Tradesman and Ex-Baker*

**The day of conventions which gather in busy men in order that some may read prepared addresses which interest ten per cent of the audience and put the other ninety per cent to sleep is happily past. The recent annual convention of the American Bakers Association had its general meetings where notable authorities discussed important topics but the really vital work was done in the afternoon conferences. Washington Platt attends conventions constantly. He knows how often they fail to help. In this discussion he gives his ideas of what a convention should be, and asks for suggestions which will make them more practical and profitable.**

"PLEASE come in, Gentlemen, so that we can start our session. Gentlemen (rap, rap, rap) please come to order in the back of the room so that we can begin on our morning program. We are already an hour late (rap, rap, rap). **Please stop talking,** Gentlemen, so that we can listen to our first speaker." So pleads the Chairman.

How often have we heard this at Bakers' Conventions! How slow the men are to come into the Convention Hall. How they do **hate** to stop chatting together in order to listen to the speakers on the program.

Maybe the "Gentlemen" are right and "Chairman" is wrong after all. Thompson is telling Schwartz about how he overcame the troubles with his new oven, or how he increased his sales with a special loaf. They know what they are talking about. They are telling what actually happened, not what might have happened. They are vitally interested in the subject. No wonder they hate to stop their conversation in order to listen to a speaker on "Bakery Advertising in Australia." Maybe the man-to-man discussion by the bakers themselves is the best part of a Convention. Maybe this and the good fellowship is what we really come to Conventions for, and the set speeches are a sort of necessary evil like music with our meals. Many convention hounds are coming to this opinion. This applies especially to the State Conventions.

### *There is a Reason*

What is the answer? Should we have no program and merely shut the members up together in a large room and let them talk themselves to death? Well, we need hardly go as far as that.

The reason is obvious. What Thompson is telling Schwartz about that new oven would interest nearly every baker who is having troubles with his ovens. On the other hand, Thompson wants to know how to get a good volume out of a loaf rich in milk. Schwartz does not know, but there are plenty of bakers present who do know, if he could only get in touch with them.

We all like to talk about our own experiences, and we are all glad to listen (for a reasonable time) to anyone who knows what he is talking about and who can tell us something we really want to know. This is just what we get at a real Round Table Conference. Such conferences are held with great success by representatives from bakeries associated together for a common production, cost accounting or advertising service. Such conferences form nine-tenths of the very popular meetings of the American Society of Bakery Engineers—perhaps the most worthwhile from a production standpoint of any of the bakery conventions.

### *Success Depends on Careful Plans*

How should such a Round Table Conference be arranged? Like anything else, it must be carefully planned and efficiently run, if it is to be a success.

First, it must be made a main feature of the program, and not crowded off into one corner just to fill a gap when there is nothing else to do. If we are to have a real discussion we must have the proper time so as not to feel hurried. Second, for a Round Table Conference there should be a real table or tables, so as to create an informal atmosphere. Third, certain bakers who are known to be progressive and to have interesting things to report, or who have recently installed new equipment, should be invited by personal letter to be present to assist the discussion on those particular points.

Fourth, a Round Table Conference should be conducted primarily by the bakers themselves. They should bring up the topics that they desire to have discussed and should recount their own experiences. Allied tradesmen should speak only when requested to do so by the chairman. Being specialists in their line, and sometimes technically trained, they can often give a definite and authoritative answer to questions pertaining to their own line of work. However, as allied tradesmen are often more ready talkers than the bakers, they should not be permitted to drown out the latter with too much eloquence along their own lines.

### *A Good Conference Plan*

There should be a Round Table Conference on Production, and also one on Sales. Let us take the Production Conference for an example. There is a regular order for discussion. First, Raw Materials, starting with flour, then shortening, then milk, etc. Second will come Equipment, starting naturally with mixers, then dividers, rounders, proofers, etc., in logical order. Under many headings there will be nothing of interest brought up. In this case the chairman should make no attempt to drag out the discussion. In other cases a great many interesting views will be expressed. Discussions of the kind which develop new ideas and arouse general interest should not be curtailed. Better skip some of the less important headings altogether than to shut down on a discussion in which everyone is interested.

A Round Table Discussion above all requires a good chairman. He must be a man of energy and tact. He must have force enough to guide the discussion along profitable lines and prevent too much time being taken up by bores. Among the allied tradesmen at such a conference "gentlemen will not, others must not" intrude advertising of their own brands into the talk. The chairman should supply the "must" in this case. As a rule the discussion will start very slowly due to excessive modesty on the part of the bakers. The chairman must get the ball rolling. When once started, its own interest will keep it going until the question has been covered. Then the chairman should pass on promptly to the next topic.

### *A Discussion of Shortening*

Let us take a sample discussion on Shortening.

Chairman: "We will now take up the important question of Shortening. Will each member in order around the table state what percentage of shortening he is using in his principal brand of bread?"

Members do so one after the other. This gives everyone a valuable idea as to the range in the amount of shortening being used in bread. Our friend Schwartz notices that his amount is much lower than the average. Maybe using a little more would be worth trying. He makes a note to do so.

Chairman: "Will all those using lard kindly raise their hands." They do so. "Now all those using the so-called 'compounds'." Again they do so. "How many are using oil?" These raise their hands. "I thank you."

Here again all present learn something of mutual interest from one another.

Chairman: "How many are putting some of the shortening into the sponge?" They raise their hands.

"Mr. Thompson, will you kindly tell us what proportion of your shortening you put in the sponge and why you do so."

Mr. Thompson tells his experiences.

Chairman: "Will some of you other gentlemen tell us what advantages you secure from putting lard into the sponge?" They do so.

Chairman: "Has anyone ever experienced any trouble from putting lard in the sponge?"

A member of the Conference: "Can someone here tell us something about the different kinds of lard? What is leaf lard, and it is really any better for bread baking than other lard?"

This sample discussion is taken in part from a conference presided over by C. J. Patterson, one of the best of chairmen. However, every bakers' association has men who can lead a conference of this sort.

### *Objections Versus Advantages*

What are the objections to making such Round Table Conferences form the larger part of the set programs at bakers' conventions. First: Only the most progressive organizations have tried them in earnest. They are as rare as high speed mixers were five years ago. Second: it is more trouble for the chairman to lead and control a live discussion, than to sit back and doze while some speaker reads a long paper (which will be printed in the trade papers anyway.)

Some of the advantages are that real discussions of real problems by the bakers themselves are the most worth while part of any convention. Again we all take more interest at a gathering where "everyone takes part in the singing" rather than listening to a paid chorus laboring through some difficult piece. The Round Table plan puts the program back into the hands of the bakers where it belongs.

### *Good Points Should be Published*

At a very few of the larger Conferences, it is worth while to have a stenographer take down all the discussion. At many others a secretary can be appointed from among those present. He notes down each question discussed, any actual figures brought out (as by raising hands) and gives a brief summary of the remarks of others. Such a report can be mimeographed at slight expense (about $1.00) and sent to each member present if they so vote (and pay). Sometimes the report, if well written up and considerably abridged, will be printed in one of the bakery trade papers.

The present form of Bakery Convention Program, made up of set speeches largely by outsiders, has been of the greatest value in the past. Maybe the usefulness of such programs is now over. Certainly there are many indications of a desire for some improvement. One form of improvement, namely, the Round Table Conference, has been set forth here. This has already proved successful in a number of organizations.

What do others think? Who would stick to the present form of program? Who likes the idea here suggested? Who has something still better to offer? Let's hear from you.

# Sugar in Breadmaking

## *Some Experiments with Cerelose and Cane Sugar*

By C. B. Morison and P. L. Gerber

THE practice of including fermentable sugars in bread dough formulas has led to the use of a variety of saccharine ingredients. These are granulated cane sugar or sucrose from the sugar cane or beet, a highly purified dextrose, such as Cerelose made by the Corn Products Refining Co., diastatic and non-diastatic malt extracts and syrups, invert sugar syrups, honey, confectioner's glucose, and sugar containing ingredients such as sweetened condensed milk. Recently dry malt extracts have appeared on the market.

In addition to these sugars and sugar containing ingredients, various partially converted or hydrolyzed starch products are sometimes used which contain various amounts of reducing sugars, dextrins, and starch.

At the present state of technical development in the sugar industry there are but two individual sugars that may be used economically by food manufacturers. Both sucrose and glucose can be obtained in a high degree of purity and directly weighed out for the purpose intended. The other saccharine ingredients used in baking are rather complex systems of sugars, other carbohydrates and constituents. According to several authorities the commercial production of other individual sugars is possible, and the time may come when levulose and also maltose will be economically produced and marketed for use in the preparation of bakery products and other foods.

A convenient classification of the saccharine ingredients used in baking is as follows:

### 1. INDIVIDUAL SUGARS OF HIGH PURITY.

(a) **Sucrose, chiefly obtained from sugar cane and sugar beet.** It should contain at least 99.5% of sucrose. Analyses of granulated sugar often show 99.8% of sucrose. Some bakers assume that there is a difference between cane sugar and beet sugar and that preference in purchasing and use should be always given to cane sugar. There is no good reason for this assumption. Pure crystallized sucrose from either the sugar cane or the sugar beet is the same chemically, and no test will establish that sucrose of the same degree or refinement from these two sources is different. The best refined beet sugar manufactured in this country will give as good results in baking as cane sugar, and experiments made at the California Agricultural Experiment Station indicate that both cane and beet sugar have the same value for canning when of the same degree of crystallization.

(b) **Dextrose or d. Glucose, sometimes called starch sugar, corn sugar, grape sugar, and the trade designation Cerelose.** Dextrose is widely distributed in nature and is found in nearly all plants. Its commercial production from highly pure corn starch has been made possible by the study of crystallization and purification problems which until a few years ago restricted the manufacturer to such starch products as corn syrup, confectioner's glucose and grades of corn sugar of comparatively low purity. Analyses of Cerelose indicate that it contains on a dry basis 99.5% of dextrose. A typical analysis

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of Cerelose made in the Institute laboratory was as follows:

| | |
|---|---|
| Moisture | 8.74% |
| Solids | 91.26 |
| | 100.00% |

The total solids contained over 99.5% of dextrose.

Another typical analysis of Cerelose is:

| | |
|---|---|
| Moisture | 7.80% |
| Dextrose | 91.74 |
| Dextrin | .37 |
| Ash | .09 |
| | 100.00% |

## 2. SUCROSE PRODUCTS.

(a) **Invert sugar syrup.** This product is usually made by treating sucrose solutions with acids. Various grades are offered to the baking industry of varying composition, color, flavor, and other characteristics.

A typical analysis of a high grade invert sugar syrup is as follows:

| | |
|---|---|
| Water | 20.46% |
| Invert Sugar | 54.21 |
| Sucrose | 24.50 |
| Ash | .02 |
| Undetermined | .81 |
| | 100.00% |

This sample was water white in color and free from acid.

The term "invert sugar" in chemistry is applied to the product obtained from the action of an acid or enzyme upon sucrose and is composed of equal parts of dextrose and levulose.

In addition to "invert sugar" syrup other sucrose products such as molasses and refiners' syrup are sometimes used.

## 3. GLUCOSE PRODUCTS.

(a) **Glucose, mixing glucose, confectioner's glucose, commercial corn syrup.** They are made by the action of pure hydrochloric acid on a high purity corn starch under carefully controlled conditions so that the resulting syrup will contain about one third reducing sugars. The sugars present are chiefly dextrose or glucose, and probably some maltose. It also contains a considerable amount of dextrins. The acid solution after conversion is neutralized, filtered, and concentrated to the required gravity. A typical analysis of a 43° Be′ glucose syrup is as follows:

| | |
|---|---|
| Moisture | 17.50% |
| Reducing Sugar as Dextrose | 34.70 |
| Dextrins | 47.50 |
| Ash | .30 |
| | 100.00% |

In this analysis the reducing sugar is calculated as dextrose, but it is probable that some maltose is present.

## 4. MALT PRODUCTS.

(a) **Malt extracts and syrups,** for use in baking are largely produced by the evaporation and concentration of the filtered wort from a mash of cereal grains. They are either diastatic or non-diastatic, and may also have considerable protein splitting or proteolytic activity. The average analysis of sixty-two samples of commercial malt extracts and syrups made in the Institute laboratories is as follows:

| | |
|---|---|
| Sp. Gr. 20° C | 1.393 |
| Bé.° | 40.9 |
| Moisture | 23.19% |
| Total Solids | 76.81 |
| Reducing Sugars as Maltose | 65.11 |
| Protein N x 6.25 | 5.58 |
| Ash | 1.31 |

(b) **Dry Malt Extracts and Syrups.** Recently the Institute has examined a commercial dry malt extract, made by a spray process. The analysis was as follows:

| | |
|---|---|
| Moisture | 4.35% |
| Total Solids | 95.65 |
| | 100.00% |
| Reducing Sugars as Maltose | 76.23% |
| Protein (N x 6.25) | 7.65 |
| Ash | 1.83 |

### 5. SWEETENED CONDENSED MILK.

These products will contain from 40 to 42% of sucrose.

### 6. HONEY.

Honey was the chief sweetening agent of ancient times before sucrose became the chief commercial sugar. It consists of a complex mixture of sugars originally present in flowers and partially converted by the honey bee.

The average analysis of various honeys reported by Browne is as follows:

| | |
|---|---|
| Water | 17.70% |
| Sucrose | 1.90 |
| Levulose | 40.50 |
| Dextrose | 34.48 |
| Dextrins | 1.51 |
| Ash | .18 |
| Undetermined | 3.73 |
| | 100.00% |

Honey is one of the sweetest of natural products because it contains a higher proportion of levulose than dextrose.

### 7. PARTIALLY CONVERTED STARCH PRODUCTS.

These ingredients contain relatively small amounts of reducing sugars chiefly dextrose and maltose. They are made by the action of acid and heat on starch under conditions which permit but slight conversion of the starch.

A typical analysis of a well known corn starch product of this description, which among other claims, is sold to the baker as a source of fermentable sugar, was found by the Institute laboratories to contain but 5.89% of total reducing sugars calculated as dextrose. It contained nearly 34% dextrins and the remainder was chiefly starch, present in both the soluble and insoluble state.

The classification of the sugars and other carbohydrates which are present in these ingredients from the chemical standpoint and some of their properties is also of importance to the baker who wishes to have a better understanding of their role in the fermentation of doughs and their influence on the bread.

A brief review of this subject will be presented in the second part of this paper.

(To be continued.)

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## *Food Shortage? Ha! Ha!*

THE most famous savants have recently held their annual meeting in London and have made what they consider to be a very important discovery to the effect that within a short time the entire world will be in the throes of a food shortage. The population is catching up with the food supply and there is no new farm land in sight.

The man who started this great food scare was Sir Daniel Hall of Oxford University, who first discovered it several months ago while trying to get a square meal in a one-arm restaurant just off Trafalgar Square. "The supply of calories is rapidly diminishing," said he, and this is sad news for those who like calories. I do not fancy them myself, and have always preferred food without any calories in them.

I have dined in these restaurants that serve calories and put the number of calories down beside each article, and I have always felt as though I were eating by adding machine methods.

The foods containing the least number of calories always taste the best.

There is whole wheat bread, which I suppose contains more calories than anything else in the world, and I would just as soon eat a freshly laundered wash rag as a slice of that wholesome food. If calories disappear entirely—fried, boiled, roasted, or calories en casserole—I will not complain. They are a very dismal food—like snails.

If a man doesn't like calories, he can starve to death with a pocket full of them and never have a regret.

—**Roy K. Moulton in Herald-Examiner.**

# Business and Conventions

## *The Success of Modern Business Largely Rests in Pooled Experiences*

By Merle Thorpe

*Editor of "Nation's Business"*

"GIVE us this day our daily bread," is still the prayer of all mankind; but the processes that make the giving possible have been transferred from the home to the factory.

Baking is now a tremendous industry. To an outsider, its growth is amazing. In 1886, during the G. A. R. encampment at Des Moines, the bakers of that city and surrounding towns, were unable to supply sufficient bread for the visitors. That's the old picture of the hand craft.

Today bread making is on a mass production basis. It is a machine job in this great land of ours. There are only 5,000 more bakeries to bake for all America than there are bakeries to bake for the city of Paris alone.

Wheat formerly was responsible for 80% of the cost of a loaf of bread. Now, I am told, it represents about 20%. For bread, formerly baked by individuals, is now engineered by technical institutions, financed by great banks, and bread stocks are quoted on the stock exchange. Thus the world's oldest industry has become, in this country at least, one of the newest and most amazing.

Twenty nine years ago, the American Bakers' Association was organized. Your charter clearly explains the purpose you had in mind when you formed a trade association, namely, education, regulation, improved merchandizing, co-operation, and creation of a better public understanding. Vital purposes all. The individual baker alone could not undertake such work. But through a trade association, the individual baker may accomplish these purposes for the benefit of his own business. Through the trade association the small individual baker has made available to him, technical and executive ability which only the largest corporations could afford individually. And through your conventions, you are enabled to get together to thresh out problems and exchange experiences.

Just now there is a vogue among the Intelligensia, the long-haired men and short-haired women, the smart Alecky paragraphers, to ridicule and sneer at business men who attend conventions and belong to service clubs. They picture the business man as a fat-faced Babbitt with no imagination, no culture; a money-grabber—selfish and sordid. One writer recently said, in a national magazine, that the fear of a living death brought the American business men into group luncheons where a songmaster with a lash in his hand went up and down the tables exhorting his fellow members to "sing, damn ye—show that you are good fellows." The butter and egg man, as typical of American business, is held up to scorn and levity by public plays, short stories, and the wheezes of the paragrapher. It has been for some time a favorite indoor sport.

### *Ridicule as a Weapon*

Ridicule is a powerful weapon and there is no doubt that many business men have been just a little bit ashamed to act as they have in the past. I doubt not that there are men absent today who have had their enthusiasm chilled and the judgment dulled by this criticism.

But do you know that while the jokesmiths were fabricating their jokes and incidentally getting pay from the butter and egg men for them, a group of British industrialists was visiting this country to learn, if possible, why America was making such rapid strides towards industrial mastery of the world? Then when they returned home they made their report—which has just been published—and, for one thing, stated that they were amazed (and amazed is the word they used) at the way American business men get together in conventions, meetings, and luncheons, and with fine generosity pooled their business experiences, exchanged their trade secrets, and thus, because of teamplay and co-operation, are making it possible for America to show its industrial tail-lights to the rest of the world.

One of the London journals, commenting on this phase of the report, stated that in London there were business men of three generations in the same line of business who had never met each other; that there were business men on the same street who had not spoken to each other for twenty years.

So, let us take heart! Let us at least believe that there is something in the American idea and not be stampeded by the shafts of the poor wit of our traducers.

### *Business Men Have Imagination*

As for the business man being unimaginative—I am inclined to think that he has as much imagination as the writer who conjures up wonderful and fearful adventures to please the tired business man. One of them was in my office the other day and with a patronizing air which is so typical in their ilk, expressed sorrow for me in my undertaking of editing a magazine for a business man. "You must get fiction into it," he said, "and snappy dialogue, and put a pretty girl in a bathing suit on the cover, if you expect to interest the tired business man. Don't you know that he can't read; that he gets his information through his skin? That if he didn't have the 'Follies' to go to, he would die of rot?"

While he was deploring the lack of imagination in the business man, I couldn't help thinking of the man in New Haven who is fighting today to get a shipment of alarm clocks through the fastnesses of the Himalayas, and of those two boys who set out in Rochester 20 years ago to change the age-old ideas of the clothes we wear and they started our third greatest industry—the ready-made suit industry. And of that man named White who, peddling his candies up and down streets of Cleveland, observing us chewing toothpicks and straws and said he would capitalize that idiosyncrasy and went to Yucatan and taught us to chew $5,000,000 worth of gum a year and now they tell me Bill Wrigley, Jr., is in China teaching the Chinese to throw away the betel nut and chew spearmint! Imagination! The businessman has it to the nth degree. And he has the courage of his imagination.

And he has done this not because he is a money-grabber. He, too, has the impulse which founded this organization—that of service to his kind. He, too, has the professional aspect toward his work; he is inarticulate but down deep in his heart you will find the American business man sharing the feeling of the professional man that he too is of service, that he is making possible mental and spiritual growth because of the material comforts he has provided.

If he had the time to knock off from his work to answer the quips and slings of smart paragraphers; to reply to the soap box orators, he might answer all and with truth, "In spite of all its faults, and it has many, this industrial system which American business has founded, has produced three times the material comforts that all the world had been able to produce up to 1776."

And he could rest his whole case there.

HOME ECONOMICS DEPARTMENT
UNIVERSITY OF ILLINOIS

# Experiments in Incorporating Dry Skim Milk in Bread Doughs

By Geo. W. Amidon
*Department of Research, American Institute of Baking*

THERE is a difference of opinion among bakers as to the best method of incorporating dry skim milk in bread doughs to obtain the most satisfactory results. Some maintain that the method of incorporation is of little importance, others that the best results are secured by dissolving the dry milk with water in the presence of sugar, others by dissolving it with the yeast, and still others advise that it should stand overnight in contact with water.

In order to facilitate solution and obtain uniformity, mixers or homogenizers have been designed and recommended for dissolving or reconstituting the dry milk. These machines are found in but comparatively few shops. In most shops the dry milk is dissolved with the aid of a hand whip or beater. This study was not concerned with the convenience or labor saving features of the various methods, but deals with their effect upon the resulting bread.

The experimental work is divided into three parts, Series I, II, and III.

**Series I.** These results are reported in Graph No. 1 and include the following:

1. Standard loaves without dry skim milk.
2. Dry skim milk was incorporated in the dough directly without being dissolved.
3. The dry skim milk was thoroughly homogenized in a malted milk mixer such as is used at soda fountains.
4. The milk was thoroughly homogenized with the yeast. This homogenized milk-yeast solution was allowed to stand 15 minutes before being incorporated in the dough.
5. The milk was thoroughly homogenized with the sugar.
6. An attempt was made to dissolve the milk as is done in the average bakery. That is, a whip was used and the milk as incorporated in the dough was largely in solution but still contained a few lumps of undissolved milk.

**Series II.** The claim has been made that allowing the reconstituted milk to stand for a period of time before incorporation in the dough results in a better loaf of bread than if the reconstituted milk is incorporated immediately. Three experiments were made as follows:

1. The milk was homogenized and incorporated in the dough immediately.
2. The milk was homogenized and incorporated in the dough after standing two hours.
3. The milk was homogenized and incorporated in the dough after standing overnight.

**Series III, Graph No. 2.** This experiment was made to determine whether the length of time of homogenization of the milk had any effect upon the bread. The results are reported in Graph No. 2. Three experiments were made as follows:

1. The milk was homogenized for one hour.
2. The milk was homogenized for 15 minutes.
3. The milk was homogenized for one minute.

Two flours were used in each series of experiments, a well known brand of spring wheat flour and a well known brand of winter wheat flour. The dry milk was the same as that used in previously reported work. The analysis of the milk was as follows:

| | |
|---|---|
| Moisture | 4.07% |
| Protein (N x 6.38) | 39.25% |
| Lactose (by difference) | 47.68% |
| Fat | 1.21% |
| Ash | 7.79% |
| | 100.00% |

The analysis of the flours was as follows:

| | Spring Wheat | Winter Wheat |
|---|---|---|
| Moisture | 12.85% | 12.44% |
| Ash | 0.44% | 0.39% |
| Protein | 12.05% | 10.88% |

Doughs large enough for two loaves of bread were mixed in each case. These doughs were fermented in one piece, divided at the bench into two loaves, and these loaves were proofed and baked separately. The average of the scores of these two loaves was taken. The baking data is the average of two to four complete experiments on each flour. The standard 60-28-12 or "finger indentation" method was used for judging the fermentation time. A high speed laboratory mixer was used, as previously described.

*Summary and Discussion*

In all the experiments reported in this paper, unless otherwise noted, the dry skim milk was homogenized for one minute, including the time of incorporating the dry milk into the water. The malted milk homogenizer operates at a much higher rate of speed than the commercial homogenizers such as the Carey and the Merrell-Soule.

*Series No. 1 (Graph 1)*

These results indicate that if the milk is thoroughly homogenized, either by itself, with yeast, or with sugar, the maximum loaf is obtained. The conclusion may also be drawn from this data that mixing the milk by hand with uncomplete solution gives a loaf slightly inferior to that made from the homogenized milk. Merely adding the dry milk to the flour without solution is thoroughly bad practice. In the case of one flour, it resulted in a loaf inferior to bread made with no milk, and in the case of the other flour, the loaf was

**Baking Data for Series No. 1**

| | | Standard No Dry Skim Milk | Dry Skim Milk Incorporated without Dissolving | Dry Skim Milk Dissolved by Homogenization | Dry Skim Milk Dissolved with Yeast | Dry Skim Milk Dissolved with Sugar | Dry Skim Milk Dissolved by Hand |
|---|---|---|---|---|---|---|---|
| | % | 1 | 2 | 3 | 4 | 5 | 6 |
| Formula— | | | | | | | |
| Flour | 100.00 | 650 gr. | 650 | 650 | 650 | 650 | 650 |
| Sugar | 3.08 | 20 gr. | 20 | 20 | 20 | 20 | 20 |
| Salt | 1.85 | 12 gr. | 12 | 12 | 12 | 12 | 12 |
| Yeast | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Water | .... | 429.0 gr. | 454.18 | 454.18 | 454.18 | 454.18 | 454.18 |
| Shortening | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Dry Skim Milk | 5.0 | .... | 32.5 gr. | 32.5 | 32.5 | 32.5 | 32.5 |
| Absorption | | 66.0 | 69.88 | 69.88 | 69.88 | 69.88 | 69.88 |
| Temperature of Dough ° F. | | 83.0 | 83.5 | 83.0 | 83.5 | 83.0 | 83.0 |
| Weight of Formula | | 1141.0 | 1198.68 | 1198.68 | 1198.68 | 1198.68 | 1198.68 |
| Fermentation Time (Mins.) | | 150 | 150 | 155 | 155 | 145 | 145 |
| Proof Time (Mins.) | | 61 | 53 | 56 | 56 | 56 | 57.5 |
| Volume of Loaf (cu. cms.) | | 1995 | 1926 | 2092 | 2032 | 2103 | 2038 |
| Total Score of Loaf | | 86.75 | 85.62 | 89.5 | 89.87 | 90.25 | 88.37 |

Baking Data for Series No. 2

| | | Winter Wheat Flour | | | Spring Wheat Flour | | |
|---|---|---|---|---|---|---|---|
| | | Reconstituted Skim Milk Incorporated Immediately | Reconstituted Skim Milk Incorporated After Standing 2 Hours | Reconstituted Skim Milk Incorporated After Standing 16 Hours | Reconstituted Skim Milk Incorporated Immediately | Reconstituted Skim Milk Incorporated After Standing 2 Hours | Reconstituted Skim Milk Incorporated After Standing 16 Hours |
| | % | 1 | 2 | 3 | 1 | 2 | 3 |
| Formula— | | | | | | | |
| Flour | 100.00 | 650 gr. | 650 | 650 | 650 | 650 | 650 |
| Sugar | 3.08 | 20 gr. | 20 | 20 | 20 | 20 | 20 |
| Salt | 1.85 | 12 gr. | 12 | 12 | 12 | 12 | 12 |
| Yeast | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Water | .... | 434.68 gr. | 434.68 | 434.68 | 447.68 | 447.68 | 447.68 |
| Shortening | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Dry Skim Milk | 5.0 | 32.5 gr. | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 |
| Absorption | | 66.9% | 66.9 | 66.9 | 68.9 | 68.9 | 68.9 |
| Temperature of Dough ° F. | | 81.5 | 81.9 | 81.0 | 79.4 | 81.0 | 79.6 |
| Weight of Formula | | 1179.2 | 1179.2 | 1179.2 | 1192.2 | 1192.2 | 1192.2 |
| Fermentation Time (Mins.) | | 168 | 157 | 166 | 173 | 161 | 177 |
| Proof Time (Mins.) | | 57.7 | 55.5 | 59.5 | 51.5 | 51.3 | 55.5 |
| Volume of Loaf (cu. cms.) | | 2093 | 2082 | 2139 | 2039 | 2179 | 2146 |
| Total Score of Loaf | | 91.62 | 91.37 | 89.87 | 91.37 | 92.50 | 91.44 |

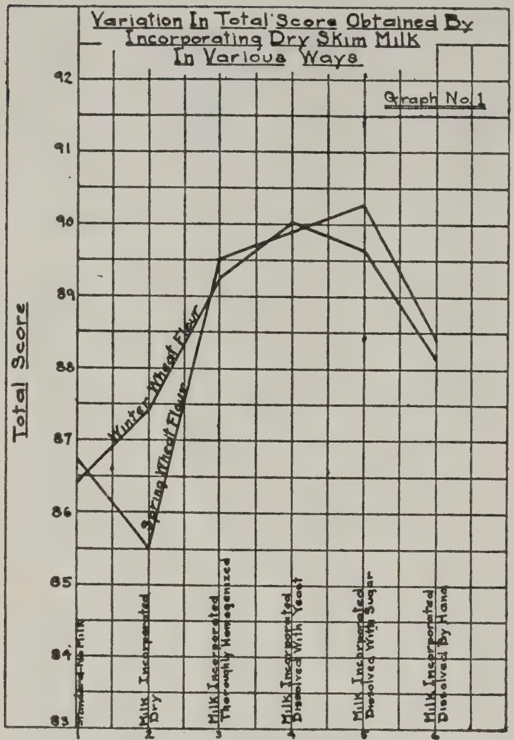
Baking Data for Series No. 3

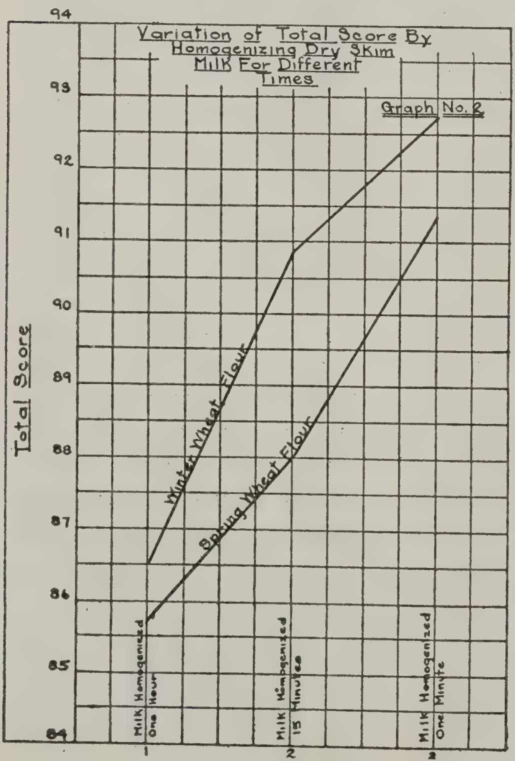
| | | Winter Wheat Flour | | | Spring Wheat Flour | | |
|---|---|---|---|---|---|---|---|
| | | Dry Skim Milk Homogenized for 60 Minutes | Dry Skim Milk Homogenized for 15 Minutes | Dry Skim Milk Homogenized for 1 Minute | Dry Skim Milk Homogenized for 60 Minutes | Dry Skim Milk Homogenized for 15 Minutes | Dry Skim Milk Homogenized for 1 Minute |
| | % | 1 | 2 | 3 | 4 | 5 | 6 |
| Formula— | | | | | | | |
| Flour | 100.00 | 650 gr. | 650 | 650 | 650 | 650 | 650 |
| Sugar | 3.08 | 20 gr. | 20 | 20 | 20 | 20 | 20 |
| Salt | 1.85 | 12 gr. | 12 | 12 | 12 | 12 | 12 |
| Yeast | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Water | .... | 434.7 gr. | 434.7 | 434.7 | 447.7 | 447.7 | 447.7 |
| Shortening | 2.31 | 15 gr. | 15 | 15 | 15 | 15 | 15 |
| Dry Skim Milk | 5.0 | 32.5 gr. | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 |
| Absorption | | 66.9 | 66.9 | 66.9 | 68.9 | 68.9 | 68.9 |
| Temperature of Dough ° F. | | 81.5 | 83.5 | 83.5 | 80.0 | 81.0 | 79.0 |
| Weight of Formula | | 1179.2 | 1179.2 | 1179.2 | 1192.2 | 1192.2 | 1192.2 |
| Fermentation Time (Mins.) | | 162 | 138 | 156.5 | 177.5 | 166.5 | 177.5 |
| Proof Time (Mins.) | | 48.5 | 54.5 | 54.5 | 46.0 | 46.5 | 51.0 |
| Volume of Loaf (cu. cms.) | | 1967 | 2120 | 2154 | 1896 | 1938 | 2180 |
| Total Score of Loaf | | 86.50 | 90.87 | 92.75 | 85.75 | 88.0 | 91.37 |

but slightly better than the loaves made with no milk.

### *Series No. 2*

The results of this experiment were negative. No improvement of any kind could be noted in the bread by allowing the reconstituted milk to stand either for two hours or overnight before being incorporated in the dough. In connection with this experiment a related one was made. The claim has been made that allowing the reconstituted milk to stand





overnight, or for a period of time equivalent to it, in contact with the salt and Arkady to be used in the dough, enables the baker to obtain an increased absorption of from 2 to 5%. This experiment was carefully made, but no evidence of this increased absorption was obtained.

### *Series No. 3 (Graph No. 2)*

Homogenizing the reconstituted milk for an excessive period of time undoubtedly injured the baking quality of the milk to a considerable extent. However, it is believed that the results are of little practical significance for the reason that the laboratory mixer used ran at such an excessively high speed. A mixing period of one minute on the homogenizer used in this work is equivalent to a mixing period of about ten minutes on a commercial homogenizer. As a few minutes mixing with these commercial machines is sufficient to give a thoroughly homogenized milk, it is unlikely that bakers would allow them to run for a length of time sufficient to injure the milk. However, it is interesting to note that milk may be overmixed so as to injure its baking quality.

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## *A Street Named "Bread"*

There is a street in London called "Bread Street," and it is famous for having been the birthplace of the great English poet, Milton.

The street received its name in the 14th century from the fact that it contained a market where bread was sold. At that time bakers were allowed to sell their wares nowhere else in London.

At one time there was a celebrated tavern on Bread Street which was the rendezvous of some great literary men of the 16th century including Shakespeare and Ben Johnson.

# Apple Pie—A Glorious Unity of Fruits and Flavors*

By HENRY WARD BEECHER

HOW often people use language without the slightest sense of its deep, interior meaning! Thus no phase is more carelessly or frequently used than the saying, "Apple-pie order." How few who say so reflect at the time upon either apple-pie or the true order of apple-pie! They may have been born in families that were ignorant of apple-pie: or were left to the guilt of calling two tough pieces of half-cooked dough, with a thin streak of macerated dried apple between them, of leather color, and of taste and texture not unbecoming the same,—an apple-pie! But from such profound degradation of ideas we turn away with gratitude and humility, that one so unworthy as we should have been reared to better things.

We are also affected with a sense of regret for duty unperformed; for great as have been the benefits received, we have never yet celebrated as we ought the merits of apple-pie. That reflection shall no longer cast its shadow upon us.

"Henry, go down cellar, and bring me up some Spitzenbergs." The cellar was as large as the whole house, and the house was as broad as a small pyramid. The north side was windowless, and banked up outside with frost-defying tanbark. The south side had windows, festooned and frescoed with the webs of spiders, that wove their tapestries over every corner in the neighborhood, and when no flies were to be had, ate up each other, as if they were nothing but politicians, instead of being lawful and honorable arachnidae. On the west side stood a row of cider barrels: for twelve or twenty barrels of cider were fit provision for the year,—and what was not consumed for drink was expected duly to turn into vinegar, and was then exalted to certain hogsheads kept for the purpose. But along the middle of the cellar were the apple bins; and when the season had been propitious, there were stores and heaps of Russets, Greenings, Seeknofurthers, Pearmains, Gilliflowers, Spitzenbergs, and many besides, nameless but not virtueless. Thence selecting, we duly brought up the apples. Some people think anything will do for pies. But the best for eating are the best for cooking. Who would make jelly of any other apple, that had the Porter? Who would bake or roast any other sweet apple, that had the Ladies' Sweeting,—unless, perhaps, the Talman Sweet? and who would put into a pie any apple but Spitzenberg, that had that? Off with their jackets! Fill the great wooden bowl with the sound rogues! And now, O cook, which shall it be? For at that time the roads diverge, and though they all come back at length to apple-pie it is not a matter of indifference which you choose. There is, for example one made without undercrust, in a deep plate, and the apples laid in, in full quarters; or the apples being stewed are beaten to a mush and seasoned, and put between the double paste; or they are sliced thin and cooked entirely within the covers; or they are put without seasoning into their bed, and when baked the upper lid is raised, and the butter, nutmeg, cinnamon, and sugar are added; the whole well mixed, and the crust returned as if nothing had happened.

But O be careful of the paste! Let it not be like putty, nor rush to the other extreme, and make it so flaky that one holds his breath while eating for fear of blowing it all away. Let it not be plain as bread, nor yet rich like cake. Aim at that glorious medium, in which it is tender, without being fugaciously flaky; short without being too short; a mild, sapid, brittle thing, that lies upon the tongue, so as to let the apple strike through and touch the papillae with a mere effluent flavor. But this, like all high art, must be a thing of inspiration or instinct. A true cook will understand us, and we care not if others do not!

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*This essay is popularly known as Beecher's Sermon on Pie.

Do not suppose that we limit the apple-pie to the kinds and methods enumerated. Its capacity in variation is endless, and every diversity discovers some new charm or flavor. It will accept almost every flavor of every spice. And yet nothing is so fatal to the rare and higher graces of apple-pie as inconsiderate, vulgar spicing. It is not meant to be a mere vehicle for the exhibition of these spices, in their own natures. It is a glorious unity in which sugar gives up its nature as sugar, and butter ceases to be butter, and each flavor—some spice gladly evanishes from its own full nature, that all of them by a common death, may rise into the new life of apple-pie! Not that apple-pie is no longer apple! It, too, is transformed. And the final pie, though born of apple, sugar, butter, nutmeg, cinnamon, lemon, is like none of these, but the compound ideal of them all, refined, purified, and by fire fixed in blissful perfection.

But all exquisite creations are short-lived. The natural term of apple-pie is but twelve hours. It reaches its highest state about one hour after it comes from the oven, and just before its natural heat has quite departed. But every hour afterwards is a declension. And after it is one day old, it is thence-forward but a ghastly corpse of apple-pie.

But while it is yet florescent, white or creamy yellow, with the merest drip of candied juice along the edges, (as if the flavor were so good to itself that its own lips watered) of a mild and modest warmth, the sugar suggesting jelly, yet not jellied, the morsels of apple neither dissolved not yet in original substance, but hanging as it were in a trance between the spirit and the flesh of applehood, then, when dinner is to be served at five o'clock, and you are pivoted on the hour of one with a ravening appetite, let the good dame bring forth for luncheon an apple-pie, with cheese a year old, crumbling and yet moist, but not with base fluid, but oily rather; then O blessed man, favored by all the divinities! eat, give thanks, and go forth, "in apple-pie order!"

## *I Am Bread*

I COME from the sunny prairies and from the bright waters of a thousand springs.

I sleep under the winter snows; I wake to life at the magic call of Spring; I shine green and brilliant in the glowing softness of morning; I grow to a waving ocean toyed with by the zephyrs of the smiling noon; in the evening I bow under my golden riches.

I pour in a flood over all the world; I enter great mills; in creamy white, rich with bone and brain and brawn, I pass the portals of countless temples of an ancient guild; I meet yeast and salt and sugar; steel arms caress me; cleanly machines guide and form me; hot ovens make me a new alchemy; and I become the wondrous staff of life.

I am bread.

—"Better Bread."

Mincing of meat in pies saveth the grinding of teeth.

—Bacon.

HOME ECONOMICS DEPARTMENT
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# The Four o'Clock Lunch

WHEN a short two years ago American Institute of Baking timidly began its advocacy of a mid-afternoon lunch for growing children it found most mothers and many members of the older school of dietetics still convinced that between meal feeding destroys appetites and disturbs digestions. Teachers were unanimous however, in their belief that the general introduction of recess feeding had energized children to do better work in the school room and improved their health as well. But old notions die hard and it took courage to ignore the taboo which for generations has denied children the right to satisfy the demands of hunger if that call came between the noontime lunch and the evening meal.

Today the fourth meal for children has become almost general practice. On the Pacific Coast the movement to feed children when their bodies need food irrespective of dinner hours was given momentum by the use of the slogan A Fourth Meal at Four. That slogan is now heard all over the country. Angelo Patri, a leading authority on child psychology has recently written a story for the Chicago Daily News in which he advocates a four o'clock luncheon for the school child. It is a good story for mothers and teachers as well as for children for it is a sound interpretation of the latest scientific knowledge of the relation of food to good health.

"Bessie and Helen and Billie came home from school, bringing Puss Walters along. Mrs. Walters was calling at the house and they thought they might as well make the family complete. The home children put their things away and changed their clothes. Then they went into the pantry and brought out a plate of apples and another of crackers, settling themselves for a munching party.

" 'Mother', said Puss, 'can I have apples with the others? Apples and crackers?'

" 'Why Puss, it isn't anywhere near tea time.'

" 'I know, mother, but their mother lets them.'

"The visitor looked at her hostess in embarrassment. 'I always give the children a bit of lunch when they come home at 4 o'clock. First because they are hungry and need it, and then because it brings them home promptly. They eat just as much at meal time. I don't consider this between meals. It is their 4 o'clock lunch.'

"Many children would be the better for this lunch. When they reach home at noon they are under pressure to hurry back to school. They try to swallow their luncheon as fast as possible and not choke or burn themselves. It is useless for a mother to say, 'Don't hurry so. You have oceans of time,' when the child already hears, in imagination, the last call ringing.

"Better feed the children oftener and not so much at a time. When a child has the taste of the stuffy schoolroom in his mouth, spiritually and physically, he has no appetite. He has to have time to change his thoughts as well as change the air in his lungs before he can really eat heartily and effectively. The noon hour is too short, and if it were longer the child would still be carrying the school atmosphere within him. Give him a lighter lunch at noon and add to it when he comes home.

"When he has to have a midday lunch at home try to give him a meal that will not use all his energy for its digestion. I have known children to eat a hearty meal of corned beef and cabbage and potatoes and then sleep all the afternoon away. They could do no school work because their bodies were too busy attacking the huge meal.

"Each mother knows by experience what her children can eat and digest easily. Sort out the lists and select those things your particular brood gets on well with and feed them those dishes. Save the heavy ones for holidays and such times as they can work them off in the open air.

"Then when they come home after the school day serve them the 4 o'clock luncheon. In cold weather it ought to be something warm and in the hot weather it should be green and cool, or sweet and cold. Apples are the food of childhood. Make sure they have those in plenty and they won't trouble the cooky jar so much. And don't stint the cookies when its cooky time."

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## *Eating to Live*

IN printing the lyrical resolutions of James J. Montague as he boldly proclaims them in the Chicago Daily News we are prompted to give them wider publicity both because of our appreciation of the sound logic which persuades him to depend on cake and pie for the fullest measure of happiness and because we wish to assure him that the triumph of his appetite over his dietetic knowledge is but another example of the sane way in which old Mother Nature often guides us rightly in our choice of food. It is evident that poets as well as other men still suffer from the taboos by which mothers endeavor to keep children out of the pantry. When we assure them that modern science finds no indigestion or other ills in pie and cake will perchance the removal of all inhibitions from their appetites stimulate the rhythmic flow of their gastronomic appreciations? We hope so. And indeed it should.

If I should choose a more hygienic diet,
A balanced ration which would suit my need,
Undoubtedly I'd profit highly by it.
And grow to be lusty man, indeed.
Although it takes a little education
To bring a fellow peace and happiness,
I have it on the highest information
That what he eats assists him to success.
I'm sure that if I chose my dietary
From simple foods, like milk and cheese and grains,
Although I might not eat, drink, and be merry,
I would amass a lot of golden gains.
But while I rose to wealth and fame and power,
Amid my stocks and bonds I'd sit and sigh—
Success for me would barren seem, and sour,
Without a daily fare of cake and pie.

I know these viands give me indigestion,
That by their means my health will soon be lost,
And I shall perish young, but it's a question
If they are not well worth the pain they cost.
But though while subject to their rough dominion,
Within me various ills run ever rife,
I notwithstanding venture the opinion
That cake and pie are all there is to life.

Success means endless years of weary labor;
It means foregoing all you want to do,
Contriving daily to surpass your neighbor
And holding only some far goal in view,
But cake and pie mean luxury and pleasure;
They banish, for the moment, woe and care
And bring one happiness in fullest measure,
And so they're going to be my daily fare.

# Foods—Facts, Fads and Fancies

*The Choice of Food Calls for Accurate Information and Common Sense*

By William M. Happ, M. D.

> **"While the sister sciences, dietetics and nutrition, are making tremendous contributions to the happiness and well-being of mankind in the building of strong, resistant bodies and the prevention and cure of many diseases, their progress is sadly hampered by the faddist and the charlatan who find them fruitful fields of exploitation."**
>
> **In these positive phrases, Dr. William M. Happ begins his forceful discussion of dietetic fads in an article printed in the August issue of the Western Dietitian. Common sense and sound logic are combined in his desire to keep dietetics within the bounds of reason.**

SOMEONE has aptly remarked that unless it be religion, there is no field of human thought in which sentiment and prejudice take the place of good judgment and logical thinking so completely as in dietetics. The great wave of popular interest in diet which has swept the country in recent years has not failed to sweep the balance of common sense for which the Yankee is so famous.

Newspapers which only a few years ago would have disdained so banal a subject now play columns and even pages to dietetic fads. It is deplorable to see how readily many grasp some new, half-baked information, without any scientific foundation, and apply it to their dietary regime, and at the same time cling to some archaic prejudices which sound scientific investigation has completely exploded. Clearly it is the function of a magazine like "Western Dietitian" to sort out from this heterogenous mass of conflicting data on foods the material which seems acceptable from the newer knowledge of nutrition. It may be excusable, therefore, to recapitulate some of the dietary fallacies which live on in spite of such knowledge. In this we do not claim superior wisdom, nor do we dogmatically condemn this or that as unscientific or old-fashioned.

### *Easy Preys for Exploiters*

The reasons for the exacerbation of popular interest in diet are no doubt complex, and in keeping with the awakening of interest in various aspects of public health. Men and women are naturally desirous of prolonging their stay on this sphere to the limit, and are thus easy prey for exploitation on short and sure routes to longevity. Furthermore, the modern styles of feminine figure and dress, demanding slimness to the point of emaciation if we follow the fashion sheets, have directed feminine interest towards reducing and staying reduced. As it is not convenient for the average woman to accomplish this by physical exercise, she turns to the easier paths of dieting. Indeed, this would seem to be the chief topic of female conversation, and whenever women get together one hears, "I am on a new diet now, you should try it," or "Have you tried lamb chops and pineapple, I have lost ten pounds in two weeks," and so on ad infinitum. It is only natural that the charlatan should utilize this feverish interest to advantage, and so "diet specialists" have come to spring up over the land, offering sure ways to health by easy paths, eliminating the knife and the pill box and approximating twilight sleep in absurd simplicity. And the people fall for it. They are eager for information, and failing to get it at the usual sources, they eat up what scraps they can get, often to their later regret.

### *Food Combinations Overdone*

We hear, therefore, without knowing exactly what is meant, of "mucous forming foods," "natural foods," "raw foods," "proper and improper food combinations," "acid forming foods," and the like. The matter of food combinations seems to have been especially overdone. People tell us in all seriousness that it is sure death to eat acids and starches at the same meal, and yet we do it every morning and live on. Milk and fish are tabooed to the point of drawing glances from waiters, questioning the sanity of the innocent who orders the two at the same meal, and yet has one ever heard of a fatality from the combination, and are not milk sauces used on fish by the best chefs? There are tables offered with two lists in parallel columns, and it is absolutely forbidden to combine any food on one side with any on the other, yet man has been doing so for centuries, and will probably continue to do so with more or less success. It is difficult to persuade people that orange juice and milk, will not kill the baby, if the two be taken at close intervals. The fear of milk curdling in the stomach is so established in the popular mind that the combination suggests sure death, yet it is first grade physiology which teaches us that milk curdles the moment it reaches the stomach from the hydrochloric acid of the gastric juice, without which normal digestion could not proceed. The difference between acidifying the milk with hydrochloric acid and with the citrus acid of orange juice must be negligible, as recent experiments in feeding the combination has shown.

From the light of our present-day knowledge it would seem that any food which is fit to eat can be eaten with any other food which is fit to eat. If the combination disagrees, then one of its members has failed to measure up to the criterion offered.

### *Foods of Ill Repute*

Certain foods have unjustly suffered bad reputations. One of these is bananas, which are tabooed by many, and yet our best sources of information tell us that bananas constitute one of the best available sources of energy (carbohydrate), and that the meat of ripe bananas can be tolerated by children with delicate digestions when other forms of starch cannot. The trouble with bananas are chiefly two things, one is too green bananas, and the other is too much bananas. Avoiding these pitfalls they are surely a useful addition to our dietary armamentarium.

Tomatoes are likewise in ill repute with many. They are acid, thin the blood and are generally objectionable. Certainly no more innocent sufferer than the tomato can be imagined. If they do not go well raw, then try them cooked. They are a very useful food.

Meat is an anathema to some, who class it with the deadly nightshade as sure death. We have therefore the vegetarians, some of whom are such from choice, and others because there is nothing else in the house to eat. In diet, notably, the sins of the parents are reflected upon the children. Just what harm meat does remains to be determined. Man is not yet removed in his evolutionary scale to the point where his carnivorous longings have been entirely replaced by puffed rice and ice cream. The sweating peasant calls for red meat, and if he gets it not, he strikes. Although there are conflicting experimental results from the feeding to animals of diets containing abnormally high percentages of protein, such high figures are not reached by the average meat eater. Such vehement carnivorae as Stefansson, the Arctic explorer, who reports living for months and years on a pure meat diet, and surviving in excellent health, need not be the model for the average man. Until we have better reason, he should continue to eat his meat along with the rest of his food and enjoy it, unless the price gets prohibitive.

### *"Natural Foods" are Dietary Fads*

In the limelight among dietary fads the palm must be given to the so-called "natural foods." Here at last has been found the conqueror of the arch enemy, constipation! Indeed, the panacea for all ills and the sure pathway to longevity! That the evil of constipation stalks among the American people is not to be wondered at when we stop to consider the twentieth century speed of living. Even the use of liberal portions of bran will not change the living habits of a nation. The populace leaped to bran as it did to Herpicide and other quick cures. As a matter of fact, bran is not a food. It is the indigestible hull of cereal grains and totally unfit for human consumption; that is, in large amounts. Roughage is to be desired in our diets, to a reasonable extent and in normal individuals, but undoubtedly much harm has come to those whose digestive tracts are not strong, by the eating of coarse irritants such as bran.

The craze for natural foods or so-called health foods is an example of the commercial exploitation of scientific research. Thus, whole wheat-flour contains vitamins and minerals and roughage and white wheat-flour does not,—ergo, eat the former and avoid the latter. It is interesting to note that the hue and cry for the banishment of white flour is led by those who derive the fair profit from the sale of whole wheat products, and that many of the health food advocates sell their products on the side. The old saw referring to the dangers of a little knowledge was never more apropos than in the matter of diet. The student of the newer science of nutrition has seen the development of the knowledge of vitamins, biological value of proteins, mineral salts, etc., and he has seen these studies lead to attempts to change the dietary habits of man, established through centuries. McCollum, who more than any other man perhaps has been responsible for the popularization of scientific knowledge of foods, in his excellent book, "Food, Nutrition and Health," very wisely says "it has been shown conclusively by experiment that whole wheat is superior in its dietary properties to any of its milled products. We are hardly justified in asserting on the basis of this fact that the nation should return to the practice of eating whole wheat flour bread instead of white flour bread. Whole wheat bread while superior to the bread made from white flour is not so satisfactory a source of the several nutrient principles necessary to make a satisfactory diet as is a combination of suitable proportions of white flour with either of the protective foods, milk or the leafy vegetables."

### *Balanced Heads and Diets*

If therefore we keep the balance of our heads as well as our diets we may continue to eat and enjoy delicious white bread and white flour products if we balance our diets with vegetables, fruit and milk. We may eat the whole wheat products but its eating should not be compulsory. We should however exercise caution in eating the more indigestible coarse breads and especially if we are led erroneously to believe that in eating whole wheat we are eating a complete food, for cereals even at best are not complete foods and are only one source of the essential dietary principles.

# Books for the Baking Laboratory

HYDROGEN ION CONCENTRATION. Its significance in the biological sciences and methods for its determination. By Leonor Michaelis, M. D. Professor in the University of Berlin, Resident Lecturer in Research Medicine in the Johns Hopkins University. Volume 1, Principles of the Theory. Authorized translation from the second revised and enlarged German edition. By William A. Perlzweig, M. A., Ph. D. Associate in Medicine and Chemist to the Medical Clinic in the Johns Hopkins University and Hospital. 295 pps. The Williams and Wilkins Company, Baltimore, 1926.

In 1914 the first edition of Prof. Michaelis' Wasserstoffionen-konzentration summarized most of the important work on this subject which was then available for the student. Six years later Dr. Mansfield Clark's book appeared and gave us an authoritative reference work on hydrogen ion concentration in the English language. Second editions of Michaelis' book in German, and that of Clark in English were published in 1922.

Now comes an English translation of the second edition of Michaelis which includes references to several important contributions made by investigators during the last few years since 1922.

The English translation is really a new edition as it contains material that was not possible for the author to include in the German original, which is indicated by appropriate letter exponents to the reference numbers and footnotes.

The first volume translated by Dr. W. A. Perlzweig is almost exclusively theoretical in treatment, and is intended to provide the student with a convenient background for the subsequent volumes which will present methods for the determination of hydrogen ion concentration and colloid chemical and biological application especially in relation to physiology and medicine.

Part one treats of the theories of the chemical equilibrium of ions, and chapters are devoted to a discussion of electrolytic dissociation, acidity and alkalinity, dissociation of strong electrolytes, state of acids and bases during salt formation, and dissociation in non-aqueous solution.

Part two has to do with the ions as sources of difference in electrical potential, with chapters on electrode, diffusion, phase boundary, membrane and absorption potentials.

A helpful feature of the book are the short summaries at the beginning of each chapter in which the discussion that follows is concisely abstracted. This is worthy of note and might be more generally followed by authors of reference works and textbooks. One of the best examples of clarity in summarizing text may be found in the Principles of General Physiology by Bayliss.

In conclusion the object of the author and translator seems to have been achieved in gathering together contributions in a special field of physical chemistry for the assistance of those engaged in biological research, especially in physiology and medicine, although it is to be expected that they may possibly find themselves involved with some of our physical chemists whose critical acumen is highly sensitive in reactions with M. D's.

The future volumes of this work will be awaited with interest by students and others who are working on problems in this field.

C. B. Morison.

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## *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Control of diastatic activity in wheat flour. II. Experiments with flour milled on a commercial scale.** R. C. Sherwood and C. H. Bailey. Cereal Chemistry 3, 163 (1926).—Germinated wheat may be added to wheat low in diastatic activity to supplement the deficiencies of the latter. Wheat sprouted for 3 days under controlled conditions proved satisfactory; that sprouted for 5 days proved unsuitable, probably because of the hydrolysis of the gluten proteins and because of the active proteases which such wheat contributed to the flour. Catalase activity of the wheat proved to be a useful index of the extent of germination. The addition of 2 or 3% of germinated wheat approximately doubled the rate of sugar production in doughs made from the resulting flours. More than 3% did not produce corresponding increases in diastatic activity. Control of the diastatic activity of flour normally low in that property can be effected within ordinary limits by gradual additions of germinated kernels to the wheat used in the production of the flour. Milling processes are not interfered with and milling yields are unaffected when 2 or 3% of wheat kernels germinated for 3 days are present in the wheat mixture. Baking strength of flour milled from wheat low in diastatic activity was increased when 3% of sprouted kernels was added to the wheat. The increased strength was registered in terms of a decidedly increased gas production, a small increase in gas retention, increased loaf volume, and superior grain and texture. Time for proofing or raising the dough in the pan was reduced; color of the crumb appeared whiter; and the crust of the loaves was browner and more pleasing in appearance when the mixture contained germinated wheat. Protein quality was seemingly unaffected by the addition of 2 or 3% of wheat which had been germinated for 3 days. Protease activity was not increased appreciably, so far as could be detected. Aging of flour milled from wheat mixtures containing up to 3% of germinated kernels proceeded normally. Baking strength of such flour under ordinary conditions of storage increased somewhat with the lapse of time. Examination of the flour after 26 months of storage showed it to be as sound as, and superior in baking strength to, flour milled at the same time from ungerminated wheat.

L. H. Bailey.

**The conditioning of wheat.** J. S. Remington. Ind. Chemist 2, 203-7 (1926).—The history of early conditioning processes and plant is covered briefly, more space being given to the processes and apparatus of Paul and Rigg, and to improvement introduced by Hall, by Samuelson & Co., by Robinson & Co. and by Evans. Paul and Rigg's process brought about the following improvements. The outer coverings are toughened while the endosperm becomes more friable and open. Less power is required to mill the wheat and the bran is removed more easily. The semolina is whiter and cleaner; there is a greater percent of broad bran. The flour is whiter and more loaves can be made per sack of flour. The present-day process consists in a hydrolyzing treatment following which the warm (about 100°F.) wheat is allowed to stand several hours. The gluten is improved, but it is impossible by any system of conditioning to add strength. Under the influence of enzymes some of the glutenin is converted to gliadin. This transformation should not proceed too far or a dough that falls during baking will result. The ratio of gliadin to glutenin has, in the opinion of Fleurent, an important bearing on the quality of flour. Others maintain there are two glutenins the ratio between which largely governs quality. Laboratory methods of checking the results of conditioning are described. The changes in strength for flours made from wheat of different origin resulting from varying the temperatures of conditioning are tabulated. Flour under the best baking conditions has a pH of 5. Much work still remains to be done.

E. G. R. Ardagh.

**Oxygen Acetate Method of Ash Determination.** By G. L. Brendel, The Larabee Flour Mills Corporation, St. Joseph, Mo.

The Oxygen acetate method for determining ash has proved to be most satisfactory because of its speed, accuracy, and simplicity. It is the result of several months experimenting in the Saint Joseph laboratory of the Larabee Flour Mills Corp. and fulfills a long felt need for a more dependable method for a fast ash determination.

The Oxygen-Acetate method requires the following procedure:

A charge of the sample to be ashed is weighed up in a platinum crucible (low form most desirable), and allowed to char into a cinder in the muffle. Removing the crucible after burning contents to a cinder, 2 cc. of a calcium acetate solution, the strength of which is approximately 60 mg. to 1 cc., is pipetted into the crucible, completely covering the cinder while yet quite warm. The acetate solution is allowed to evaporate by placing the crucibles on the opened muffle door. When the cinder is completely dried, the crucibles are placed in the muffle, the temperature of which is carried at practically 1500° F. After the samples have been in the furnace 3-4 minutes, oxygen is delivered into the muffle for a period of 10-15 minutes. The length of time that the oxygen is sent into the furnace depends largely upon the number of samples, temperature used, and the pressure of oxygen current. The period of time required for ashing a sample or samples can be regulated to meet the chemists' convenience. The ash resulting from this method is of a very light, fluffy white character. When the "glow" around the bottom of the crucibles disappears, it is an indication that the ash is "down." A blank determination is made using 2 cc. of the calcium acetate solution, and correction made for the acetate used. Calcium oxide is used for desiccation. As platinum crucibles cool very rapidly, the time required for cooling is much shorter than when other types of crucibles are used. The balance work should be rapid in using this method.

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## *The Bread and Water Diet*

MUCH printers' ink has been used during the past few months in broadcasting the story of the Nebraska judge who sentenced prohibition violators to a bread and water diet. The story has received an unusual amount of attention, and from all parts of the country have come criticisms, both favorable and unfavorable, of the judge who chose to impose this novel sort of punishment. Much of this criticism has taken the form of witticisms, but some serious-minded ones, if we were to believe the newspapers, have turned their bodies into experimental laboratories, that they might convince themselves and others that the bread and water diet was harmful or harmless.

American Institute of Baking is not interested in the legal aspects of the situation, but it is interested in the scientific facts involved. Can a man live for a considerable length of time on a diet consisting solely of bread and water? Of course the kind of bread eaten has much to do with the answer. If it were whole milk bread it is quite safe to assert that a man could live almost indefinitely on such a diet, and except for the monotony of it, remain well and happy. Here in the nutritional laboratory we have raised albino rats from weaning time to an age corresponding to 65 years in the human, on a diet consisting only of such bread and water. While the use of milk in bakers' bread is becoming more and more universal, and while the average bakers' bread contains some milk, it is hardly probable that the prisoners in Nebraska were fed all milk bread. So the question resolves itself around bread containing less milk, or possibly no milk at all.

Long before milk was used in the making of bread it was the staff of life; it has served as the chief food of millions of people; it has been the solace of the poor who had little other food; and it has served many times as almost the sole food of famine stricken peoples.

Judge Bryant would claim no originality in what to many seems a novel punishment. For centuries bread was the piece de resistance of the meals served convicts. Violators of certain rules in our own Navy were, until quite recently, punished by sentencing them to a bread and water diet.

There are few foods that contain all the elements of nutrition in a balanced form. Most foods need to be supplemented by others. If Judge Bryant had deliberately gone through the list of foods to find one which alone would best fulfil our food requirements, he could not have made a better selection. Bread is the one food of which we do not tire. It is the only one that appears three times per day on the dining table.

But why speculate on the question when the answer has already appeared? Recent news items tell us that the prisoners who have been kept on this diet, have emerged from their confinement, not only in good health, but actually heavier than when they began their sentence.

—**Roscoe H. Shaw.**

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Ah! on Thanksgiving Day, when from East and from West,
From North and from South come the pilgrim and guest:
When the gray haired New Englander sees round his board
The old links of affection restored;
When the care-wearied man seeks his mother once more,
And the worn matron smiles where the girl smiled before;
What moistens the lip and what brightens the eye,
What calls back the past like the rich pumpkin pie?

—**Whittier.**

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# The Louis Livingston Library

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THE modern library is more than a storehouse for printed and indexed facts. It is a workshop where an infinite variety of products is turned out for daily use. It gathers in raw materials of every kind and converts them into practical information on many subjects. It places new books on its shelves and then makes the knowledge buried between their covers available. It fills reference files with data gathered from many sources that every inquiry for specific facts may be supplied. The modern library is an assembly room into which is collected the literature of science and industry and from which flows knowledge rebuilt for practical use.

There is no literature of baking. The craftsman who has ground his grain, moulded his doughs and baked them before the fire has given the world its basic food through all the centuries. Poets have sung the praises of bread in every language and glorified the product of the bakers skill in immortal lines. But a five foot shelf would be far from crowded if on it were placed all the collected information about the science of baking. The oldest craft is the newest science and its literature is in the making.

When The Louis Livingston Library of

Baking was founded for American Institute of Baking and the bakers of the world a great impetus was given to the effort to organize baking knowledge for practical use.

### What the Library Contains

In this library is gathered in more than five thousand volumes the fundamental knowledge of chemistry and physics, of biology, mycology and fermentology, of mechanics and economics and all the allied and related sciences which in any way contribute to the conversion of cereal grains into human food. And special articles, reprints, bulletins of scientific societies, reports of every sort add more than twenty thousand selected and indexed contributions to the wealth of available material. Nearly two hundred different magazines come to the reading room as exchanges or subscriptions. Every important baking journal printed in this country, in England and Australia lies on the table for daily use. Most of the milling journals are there as well and many of the restaurant magazines, the food journals and the popular publications which devote space to food and nutrition. All the leading technical journals come to the library, the medical and dental journals, the dietetic magazines, the journals which exert so great an influence on the workers in the field of home economics, of nursing, of hospital feeding.

And year by year the journals which contain material of more than passing importance are bound and take their place on the shelves.

Every day the clipping bureaus send in news items of concern to the baking industry, comments on breads and pies, appreciative editorials and vicious assaults, interesting references to reducing diets or new rules in force in schoolroom cafeterias. All this material is classified and filed for future reference.

The number of pamphlets which contain references to the baking industry which are being printed by banks, statistical bureaus, and service companies is increasing every year. All this valuable data is filed where it can be put to use at a moment's notice.

### How the Library Serves

But after the books are placed on the shelves, the journals are read and abstracted and the booklets and pamphlets filed, the work of The Louis Livingston Library of Baking is but begun. For this library is a working library. Its value is not measured by the number of accessions but by the use made of the material which comes to its files.

It will fulfill its real purpose only when the information on its shelves is made available for every member of the baking industry. The baker cannot come to the library and so the library must go to him. There are many ways in which this is accomplished. Already Miss Rosabelle Priddat who for twenty-five years has been connected with the library and her assistant, Miss Louise Rein, have filled hundreds of requests for informative material covering the entire field of both practical and scientific baking practice and its application in production.

### The Package Reference Loan Library

One valuable library service is the collection of pamphlets and clippings on any required subject. If for example, a baker wishes information on the development of the baking art, a collection of pamphlets and clippings covering this subject is brought together and loaned for a limited time. During the past year many such reference packages have been sent out. The statistics of the baking industry were furnished for a Government employee in Washington. Material for a paper discussing mechanical baking was furnished a bakery proprietor. A Chicago bakery superintendent was given data from which to write a paper for use before a Rotary Club. A student of the University of Chicago was supplied with data from which he could write a paper on bread infections.

There is no limit to the value of such a library service. The material is valuable, but two things are now required to put it to use—a knowledge of the need and an adequate staff of compilers to do the work.

### *Legal and Technical Information*

The library has compiled and keeps up to date a complete file of all laws affecting the baking industry. The bread weight laws of states and cities are thus constantly available for those who may wish information on this subject. The laws relating to bread wrapping and to returned stale bread, to the sanitary condition of bake-shops and the health of employees, are filed in The Louis Livingston Library of Baking. If a baker wishes information on any of these subjects, it is not necessary for him to ask his attorney to spend days and weeks securing it for him. It is ready for his use. This file is not only serving the baker but the public official. During the past year City Clerks have asked for copies of model bakery laws; Health Departments have secured information concerning improved sanitary regulations and women's clubs interested in the legislative control of industry have used the information in the library in discussing the subject. By the use of its files the baker can do much to prevent the drafting of impractical and unnecessary regulations.

### *The Library Helps Students*

College students and pupils in High Schools are every year showing a greater interest in the development of industry. Many themes and theses now discuss the development of baking. The library contains more material for use in this way than any other store-house of facts. For more than a year a student of the University of Chicago has used the library constantly in preparing a thesis to be offered for a graduate degree. An Eastern school has come to the library for information on bakery accounting. A student in a school of commerce in a Western state finds material for use in the economic study of the baking industry which he is making. A university in Pennsylvania asks for complete sets of duplicate pamphlets and periodicals and offers valuable material from the shelves of its own library in exchange.

In a single year the librarian has prepared and sent out 650 letters containing informative material garnered from the library shelves.

### *Broadcasting the Story of Bread*

The radio offers a new means for spreading information and already many bakers are sending out the story of bread to radio audiences. Miss Priddat is supplying the material for radio talks—the library is full of interesting material from which such talks can be built up. The possibilities for service in this field are very large. The library of the future may well hope to supply information not only through the printed word but by a radio message.

Is it too much to hope that the baker who wishes to keep abreast of the times in the development of his industry and who is constantly looking for material by which to carry his story to his customers will find that The Louis Livingston Library of Baking with its wealth of facts and knowledge will some time come to be as necessary to the manufacture and sale of baked products as the materials which are gathered in the store room or the delivery wagons which take the product to the consumer?

# Managing the Boss

IN a late number of Harper's Magazine a writer who prefers to remain unknown, tells of this neglected phase of scientific management. His knowledge of his subject is evidently well earned for he subscribes himself as "one who has tried it." The whole article is well worth reading for it is full of allusions which will fit the experience of every boss and most subordinates.

"Boss Management begins in our early youth with the management of our parents. We constantly want to do things of which they disapprove. Mark Twain said in an article, 'Advice to Little Girls': 'If your mother tells you to do a thing, it is wrong to imply that you won't. It is better and more becoming to intimate that you will do as she bids you, and then afterwards act quietly in the matter according to the dictates of your best judgment.' "

This, however, is Boss Management which can hardly be described as "scientific." The true art consists in leading the boss to your opinion by causing him to think it is his own. Boss Management is the best-known example of the "art which effaces itself."

This subject will be best understood by concrete examples taken from bosses under whom the writer or his friends have worked hard and enthusiastically, or suffered in silence as the case might be. All of us who have spent our lives in industrial pursuits have had our own interesting experiences with bosses and most of us could write a book on the subject with a title similar to Ernest Seton Thompson's "Wild Animals I Have Known."

There are several kinds of bosses; the over-enthusiastic boss who is most valuable to his organization when well managed and most disastrous when out of hand; the impetuous boss who disregards system and is impatient of detail; the tyrannical boss who uses his power to abuse subordinates. "The most irritating type of boss," says the author, evidently speaking from wide experience," is the timid boss—he who is always afraid to take an important step. He encourages investigations and new ideas and takes an intelligent interest in their progress, but as the moment for final action arrives he hesitates.

The only way to manage a boss of this kind is for the subordinate to supply the courage which his boss lacks. He must force the decision and take the responsibility on himself. The result of this is, if the new idea turns out well the boss takes all the credit; if it fails, the subordinate gets the blame. However one who is unwilling to face this situation is unworthy of responsibility as boss-manager.

This type of boss is the especial *bête noir* of research men. Well do I remember an experience of the Research Chemist of a large manufacturing concern before the war. This chemist had for an immediate boss the production manager who was also vice-president of the company.

Interesting problems presented themselves from time to time, arising either from difficulties experienced in the manufacturing process, or as improvement suggested by the Chemist. As these problems arose the Vice President would take a keen interest in each. He would talk over at length the points involved, thereby airing what knowledge he had of chemistry and engineering. He would lay out with the chemist a plan of attack. He would inquire daily as to progress made and would be quite triumphant at hearing of obstacles overcome. This was all at the beginning. Finally the research would evidently be nearing a successful conclusion. The time was coming to put the new method into operation. Then the Vice President would become nervous. The thought of having to come to a decision was most distasteful. The idea that the innovation might not work out if put into general factory practice and might, in fact, become a public failure for his department was disquieting. He would lose interest in the research and seek all kinds of means to postpone a decision.

On looking over the work of several years, the Chemist found that he had attacked and solved many important problems. He had exercised a good deal of scientific skill and had produced in his laboratory many new results of great potential value. He was dismayed to find, however, that hardly any of these had been put into practical operation. This research had been interrupted when near the end. Decision on that one had been delayed until the matter could be discussed with a factory manager from Chicago whose intended visit had been finally cancelled. There were all kinds of reasons for postponing the final decision.

The chemical research, skillful as some of it was, turned out to be of little practical value to his Company, as it was not utilized. In the words of another writer on applied science, his Research Department was "like a baseball team which got all of its men to third base, but never actually scored."

Then the Chemist realized that only part of his job was to manage the movements of the molecules. An equally important phase was to manage his boss. Boss Management took time and energy away from his purely scientific work. It was, moreover, difficult and uncongenial for a man of scientific pursuits. Without Boss Management, however, his best scientific achievements were futile.

The Chemist deliberately decided to devote the necessary amount of his time to managing his boss.

In later years the Chemist found that he had done less research work, but that more of it had been put into practical operation.

The writers conclusion, reached after working with all types of bosses, is "happy is the boss who picks a good assistant. Happier still is the assistant who can pick a good boss!"

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## *A Pot of Nuts was their Diploma*

"Master-bakers were admitted at Paris, in the 14th century, in the following manner:

"When a young man had been successively winnower, sifter, kneader, and foreman, he could, by paying a certain amount to the king as legiance money, become an aspirant baker, and commence business on his own account. Four years after, he was received as master by going through certain formalities. On a given day, he set out from his house, followed by all the bakers of the town, and repaired to the residence of the master of the bakers, to whom he presented a new pot filled with nuts, saying: 'Master, I have accomplished my four years; here is my pot of nuts.' Then the master of the bakers asked the secretary of the trade whether that were true, and having received a reply in the affirmative, the master of the bakers returned the pot to the aspirant, who broke it against the wall, and was at once reckoned amongst the masters."

**Pantropheon.**

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"With grandma in the springtime
I heartily agree
She gives the family rhubarb pie
And saves the doctor's fee."

# BAKING TECHNOLOGY

**A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.**

H. E. BARNARD, Editor

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DECEMBER 15, 1926

## *We Work Together*

***To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.***

# *Why Less Bread is Eaten*

A RECENT study of food statistics confirms the statement that one reason for the lessened use of bread is a rapidly growing use of other carbohydrate foods, especially sugar. In 1921, 40,000,000 pounds of milk were used in making milk chocolate, most of which is sold in the form of nickel and dime bars to children hungry for energy foods or as desserts after inadequate lunches. In 1924 the consumption of milk for this purpose had increased to 194,000,000 pounds and last year the huge amount of 290,000,000 pounds of milk went to the making of milk chocolate. Even a casual study of these figures will show the reason for the lessened use of many hundred million loaves of bread.

Is there any good reason why some of this trade should not be diverted to the baker? Cannot cakes be made equally appealing to the child?

# *Science Serves the Table*

CAN gold be made from base metals? Will the chemist break down one element into another? These dreams of alchemists may sometime come true.

While chemists are breaking down atoms, those practical handlers of material substances, the men who transmute raw materials into finished products in a hundred thousand manufacturing plants in every city and town, are making definite contributions to human welfare. Modern industry is not interested in the transmutation of the elements but it is in an intensely practical way employing the science of chemistry in the production of better steel, finer clothing and more perfect food for housing and clothing and feeding the human race.

Leaders in this field of applied chemistry are the bakers who so rapidly are taking their position as the manufacturers of our best food. There are more than thirty thousand of these practical laboratory workers. Many of them are still handling their raw materials without any appreciation of the marvelous way in which the chemistry of ash and proteins and the biology of yeast and enzymes and fermentation processes work with them in the shop. But day by day the craftsman is stepping aside to make room for his trained son who not only knows the way to handle doughs on the bench but appreciates as his father never has done that the baking of bread is something more than a product of hard work, long hours and small profits. If the new idea of service in industry has anything in it the modern baker who knows that his customers a few years ahead will come from the groups of children which gather before his shop window will use every new nutritional fact in improving the quality of his goods. In that way he will transmute his flour and yeast into healthy children. That is the finest service of science.

# *Courage!*

THAT'S the message of industrial reports and financial statements issued at the end of this year. It is the message which goes forth to the baking industry as the new year approaches.

The fears for 1926 have for the most part dissolved into assurances of new opportunity. Dire predictions of crushing competition have brought many men to face the facts. The fundamentals of quality, service, and merchandising methods have stood out so clearly as a result of three years of readjustment that they can not be mistaken.

Dean Thomson, of the University of Illinois School of Business recently remarked that had our forefathers been able to foresee the complexity of modern business and its difficulties they would never have had the courage to write that Constitution of the United States which has been the very foundation of our progress. But these same fathers had an unshakable faith in the fundamentals of right human conduct and human liberties. On that faith has been built the whole structure of American business.

The same sort of faith lay behind the constitution of American Bakers Association, and on that basis it has been building for the bakers for nearly thirty years.

In six years alone one of the greatest industrial institutions in the world, the American Institute of Baking, has been established. While only a few years ago there were those who scoffed at the idea, today it is a monument to courage.

There have been those within the baking industry who questioned the courage of the leaders of the National Association because they refused to be drawn into every local market disturbance, while others were satisfied with the fundamentals on which the association was building for the industry.

The addresses delivered during the September convention carried the message of faith in the inherent strength of the second largest food industry, but pointed clearly to the readjustments which are to be made within the next five years, readjustments of public service, in production costs, in elimination of waste, in the validity of trade ethics, and certainly in organization within the industry.

"It is a time when the industry must speak with one voice. Put before each consumer its most fundamental and least selfish appeal. Win the consumer on that score and thereby make sure that some member of your industry gets an order."

So the Association has based its five year program on these fundamentals around which its constitution was written.

During the past year it has taken no small measure of confidence for a president to bring together the representatives of every branch of the industry, acknowledge their just claims for recognition, and within a few months to so shape events that a Federation Plan is accepted which will give every member of the industry his right to direct representation, his own share of the benefits of associated effort, and eventually reduce his dues, when he shall have decided collectively to do so.

And now another leader engenders confidence in the reawakened responsibilities of the National to its members. Henry Stude for thirteen years has followed the growth of American Bakers Association as a member of the Board of Governors, guiding with a well spoken word in its Councils when occasion demanded. Experienced in a year of struggles as president during the war, he has, to use his own expression, again found himself in the great responsibility of the Federation Plan. The industry looks to his leadership, confident that his courageous administration of the affairs of the Association will be in fairness to all and directed to the single aim of a greater baking industry. L. A. R.

# Ingredient Specifications*

By C. B. Morison
*American Institute of Baking.*

THE problem of practical and satisfactory specifications for the commodities used in industry is receiving considerable attention at present from various scientific, technical, and engineering organizations.

Secretary Hoover has pointed out the value of standardization from various important aspects, a Federal Specifications Board is engaged in formulating master specifications and the Bureau of Standards is active in the study and promotion of this movement.

A Directory of Specifications has been prepared by the Bureau of Standards which has indexed 6,650 commodities and approximately 27,100 specifications, and a Standards Yearbook will shortly be published for 1926 containing the most recent information on this subject.

It is therefore evident that there is an active interest in specifications and standardization at the present time, and that this should be recognized as a formidable and important problem in its relations with the cereal industries from many angles.

We are also well aware that the very sound of the terms specifications or standards is quite apt to produce exceedingly violent and explosive reactions in the minds of some of our best citizens. Any one who has even attended a hearing before a specifications or standards committee will recall discussions to which the epithet "heated" is but a mild reminder of what was actually said. Similar discussions are very probably not unheard of between chemists in milling or baking and purchasing agents.

### *Specifications Not Easily Formulated*

The American Institute of Baking has never attempted to establish or formulate specifications for the various ingredients used in the bakery. The inherent difficulties of the subject and the general lack of agreement in the baking industry on fundamental details required in the formulation of satisfactory specifications has militated against definite recommendations. It has, however, established a registration or certification plan for the purpose of examining baking ingredients in relation to their composition and properties, suitability for use in baking, the substantiation of manufacturer's claims, and conformity to the food laws. If a product complies with these requirements it is duly certified by the Institute and a certificate issued to the manufacturer, with a form of contract governing the use of the Institute seal of registration. This plan provides the baker with a knowledge of baking ingredients which have been actually tested in the laboratory and shop, and which is useful as a guide for the purchase of reliable products. It does not, however, discriminate between products with reference to grade or costs.

In addition to the registration plan the Institute has collected as a result of the activities of its testing laboratories a valuable amount of analytical and baking data on samples of baking ingredients received from members and others which is representative of the ingredients used by the baker in all parts of the country.

### *Specifications Still Little Used*

It is very probable that at present the baking industry as a whole does not very generally use specifications as a basis for the purchase of baking ingredients. There are of course exceptions, and some organizations which have chemists and a laboratory force purchase flour and a few other materials on specifications, but as far as the writer has been able to ascertain most bakers are quite satisfied to purchase on the claims of the salesmen, their own personal preferences, past experiences, or a willingness to try anything once. Other bakers who are more progressive but who cannot afford to maintain laboratories seek the advice of a service organization and submit samples for analysis and tests.

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* Read at Symposium on Cereal Chemistry, Kansas City.

The baker who does not recognize the value of laboratory service is quite apt to find himself involved sooner or later in a controversy with the food officials, as he may purchase adulterated or artificially colored products unwittingly and innocently and use them in a baked product with no conception of such a possibility as legal action arising. Grade, in relation to cost of material, combinations of ingredients which are sold at a cost far in excess of the total cost of each ingredient if bought separately, are some of the things that the average baker can only determine with the assistance of the service laboratory.

### *Tests and Analyses Furnish Protection*

Whether or not rigid specifications are advisable for all baking ingredients, or whether it is preferable to buy on sample is an open question, but in the interests of economy, quality and self protection, all baking ingredients should be subjected to examination and tests before they enter into the production of bread, pastry, and other baked products.

Since flour is the fundamental and basic ingredient of the baking industry, it is not surprising that attempts to formulate specifications for flour have been the subject of perennial interest since the days of the Greeks and Romans. How to accurately evaluate a given type of flour for conversion into a required baked product is still a problem for most cereal chemists. I say most, advisedly, for there are some cereal chemists who like the High Sheriff of Nottingham, have never yet made one mistake but would like to for variety's sake.

In the preparation of this paper the writer has written to several of our leading baking and milling chemists as to their ideas on specifications for flour and other baking ingredients. These men are all actively connected with their respective industries and their views are therefore of significant interest.

They all recognize that flour is subject to variation from year to year, and that specifications to be practical should be sufficiently flexible in relation to what Mother Nature has produced in the wheat fields of the country.

Most of them agree that maximum limits for moisture, ash and protein with respective tolerance may be specified, taking into consideration the characteristics of the flour as related to the available wheat, which is obviously a variable that can not be neglected.

A limit for moisture is specified, and a claim made for flour shortage if this is exceeded. The method for the determination of moisture should be stated. Standards for moisture for regulatory purposes established by food officials are not pertinent, since a moisture limit may be specified lower than that of the standard by mutual agreement. Others state that a flour whose moisture content conforms to the Federal Standard should be accepted, though some indicate that the recent modification of the moisture standard which permits 15% by the vacuum method may tend to an increase in flour moisture which may be contributory to the development of unsound flour.

Specifications for protein (N X.5.7) are generally recommended. The amount of protein specified is dependent upon various practical considerations in reference to the type of bread required. Little difficulty is experienced by some in checking within 0.20% of the amount of protein specified, although others would permit a somewhat wider tolerance.

### *The Importance of Gluten Quality*

The inclusion of detail requirements for gluten quality is probably not possible at the present time, and until we have a more satisfactory knowledge of the fundamental properties of wheat protein in relation to baking values, cereal chemists will have to be guided largely by their background of past experience and their baking tests. We should, however, recognize that the work of Gortner and associates on viscosity and the current studies of plasticity by various means, and the so-called Gluto-Graph may point the way to a better knowledge of the elusive factors in gluten quality.

Some recognized authorities in the field still place considerable confidence in the time honoured method of washing out gluten from flour and judging its qualities in the light of their experience. It may be that this test which has largely fallen into disuse is still of considerable significance and is not altogether obsolete in the present state of flour knowledge.

A maximum limit for ash is generally specified for the purpose of checking up on grade or degree of extraction. Some chemists insist that the tolerance for ash should not exceed 0.01% while others allow a wider variation from 0.02 to 0.03%. One chemist informs us that "having had some milling experience, I have found that in a run of 12 or more hours for a mill, it is probable that the ash produced in this time will vary about three points or less; that is, the ash could be 0.40% or 0.43% during this period, owing to various milling conditions that might arise. For all baking purposes this flour proves to be of the same quality as that of any that might be taken during the 12 hour run of the mill. Therefore, taking into consideration the possible error that could be made by two chemists and, also, the variation due to the milling process which is often unavoidable, I believe that in justice to ourselves and the mills that we could allow four or five points variation in ash upon a sample of flour. This is somewhat of a liberal view and I wish to make myself clear in regard to this point. For instance, if we have a mill that is giving us a flour of 0.40% ash, and one particular sample comes through with a .44 ash, I do not believe we are justified in condemning this sample. However, should the mill or the source that this flour is coming from continue to give us flour with an ash that regularly averaged 0.44% or 0.45% we could begin to question them as to whether they were sending us the same flour, or if they were giving us a flour of a somewhat higher percentage of the total flour, or in other words, a somewhat longer patent. To be frank, this is a subject that it is essential to use one's judgment in as the same percentage flour from year to year will vary greatly in ash."

### *Will the Flour Make Good Bread?*

In addition to limits for moisture, protein and ash, other detailed requirements may be necessary such as the type of wheat, its freedom from smut, weed seeds, other forms of contamination, soundness, dress, granulation, color, grade, absorption, fermentation, and the ability of the flour to make a loaf of satisfactory volume, texture, odor and taste.

The adherence to requirements for moisture, protein and ash is of little significance when compared to the great problem of inclusion in the specifications of other requirements which will meet the production needs of the consumer in terms of baking value. The current study of methods of test baking which is now being carried on by the American Association of Cereal Chemists in cooperation with other organizations should be of interest to every cereal chemist engaged in milling or baking.

If a test or series of tests can be devised which will bring out the baking value of a given type of flour it will have much importance in relation to the formulation of future specifications for this ingredient.

The recommendation of specifications for flour should not be based on arbitrary and rigid limits of composition and properties and recent correspondence with many of the leaders in the field shows a practical view point that is not generally associated with chemists.

A discussion of specifications for other baking ingredients such as salt, milk and its products, malt, sugar and other carbohydrates, shortenings, yeast, yeast foods, improvers, flavoring extracts, spices, eggs, baking powder and many others can not be undertaken with any degree of satisfaction within the limits of a short paper.

### *Conformity to Law is First Essential*

All ingredients used in the preparation of bread or other baked products should conform to the Federal and State laws governing the preparation, composition and sale of foods. Specifications should comply with the Standards of Purity for Food Products published by the U. S. Department of Agriculture, and the subsequent Food Inspection Decisions when these can be applied to the ingredient. Methods of analysis to be used in the determination of composition should be preferably those of the A. O. A. C. when these can be applied, but when other methods are required they should de described and detailed in the specifications under the heading laboratory examination.

It is obvious that the formulation of specifications for baking ingredients that do not include references to methods of analysis or examination for the purpose of determining compliance to the specifications will be unsatisfactory and that requirements for certain amounts of a product in a compound that cannot be determined accurately in the laboratory is open to objection.

A well known specification for oleomargarine states that the butter fat content shall not be less than 10% of the total fats. It would be interesting to obtain an opinion from experts in oil and fat analysis on how near they could come to detecting this amount of butter fat in an oleomargarine with accuracy.

Salt is one of the basic ingredients of bread and the content of sodium chloride, composition, and suitability for use can readily be determined in the laboratory.

The amount of sodium chloride required in a salt for baking purposes is not exactly understood by some bakers. Some of them insist on high test salt, with a sodium chloride of 99.5% or over. Salt of this high sodium chloride content can be easily obtained and the writer knows of two commercial brands of salt on the market that will test nearly 100% sodium chloride.

### *What is a Satisfactory Salt?*

As the result of considerable independent experimental work and exchange of opinion with others the writer is not convinced that a high sodium chloride test salt is required in baking. Satisfactory results are obtained with lower grades of salt, and the effect of associated salts such as calcium sulfate, calcium and magnesium chlorides, may have a desirable influence on fermentation.

Specifications for milk and its products for suitability for use in baking are highly important because of the great differences in grades that exist in these products. The baker is primarily interested in such cost considerations as butter fat content, milk solids and the cane sugar content of sweetened condensed milk.

There are many other baking ingredients that might be mentioned which are deserving of exhaustive study for the purpose of determining their economy and suitability for use in relation to specifications problems.

If the laboratory is to be of real service to the industry in the formulation of specifications and standards for purchase it should have a knowledge of the effects of ingredients in terms of practical baking results. It should also recognize that the nutritive properties of bread should be considered in the selection of ingredients.

Original material costs are an item of consequence in the construction of formulas, and specifications or standardization requirements that increase costs without compensating effects on quality is bad business.

The chief purposes of specifications and standards are economy and protection to the consumer, and ill advised, costly and impractical ones defeat their fundamental purpose.

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## *Bread and Meat*

EVERY food industry which sends its product into consumption over the grocers counter is interested in grocers. At the annual convention at Atlantic City, Charles W. Meyers, Director of Trade Relations for Armour & Company discussed many ways of interesting the grocer in his business of selling foodstuffs before the Trade Promotion conference. His closing argument and generous offer of co-operation with the baker on behalf of his great company is worth rereading.

"As old General Nathan Bedford Forest of Tennessee—down near Bernard Evers, American Bread Company, way, used to say back in those stirring times of '61 to '65: 'The man who wins the fight is the one who gets there firstest with the mostest!' In your daily battle for business, if you can get there 'firstest' with the 'mostest' in quality products, sanitary containers, attractive display arrangements and departmentizing of bakery products, increased interest upon the part of the grocer in selling bread and all of its complimentary 'cousins by dozens' if you will convince the grocer of the wonderful daily turn-over and small investment required, you will have made of him an indispensable and invaluable ally.

"And finally, in connection with the statement made by Chairman Rogers at the beginning of this session, to the effect that: 'constructive co-operation between all factors of the industry is one of the outstanding requirements of the day' I am pleased to announce that we are placing our fullest resources at the disposal of the baking industry and the American Bakers Association. Three important departments are co-ordinating their efforts in the further development of the work of the Trade Promotion Bureau, namely: our Bakers Supply department, with its research and laboratory sections, coupled with a completely equipped bake shop under supervision of a practical baker; our Trade Relations department with its merchandising plans and helpful suggestions for the baker and our Advertising department which is 'tying up' nearly twenty of our various meat and food products with bread and and bakery products in our various forms of advertising and display posters. It is our mission to assist in this worthy work of accomplishing the greatest good for the greatest number, not only for the bakers themselves but the allied trades as well."

# Light, Life and Health

**Sunlight is good for us but few of us realize the extent to which health depends on it.**

**The following story of the relation of sunlight to health is taken from a paper by Dr. Weston A. Price of the Dental Research Laboratory, Cleveland, Ohio, which appeared in a recent number of Industrial and Engineering Chemistry. While written for chemists, the subject has a popular appeal and is closely related to child nutrition.**

"THE average span of life," says Dr. Price, "has been extended in two centuries from about 20 years to about 56." Many students of human welfare confidently hope that this increase will continue until the average is 70 years. Much of this increase of span is due to the control of epidemic diseases. Future advances will be made along the line of so-called degenerative diseases. The department of social life known as preventive medicine has been largely responsible for lengthening the life span, and is the one to which we must look for further advances.

Biological sciences are revealing more and more the nature of life and the subtle factors which determine its perfection and degeneration. We are no longer looking upon the animal body as so simple a machine as a combustion motor. The last few years we have come to know that in addition to the fuel there must be certain essentials which enable the body to utilize the fuel, that life is dependent upon solar energy for the utilization of nourishment, and that the absence of 1/200,000 part of a gram of a vitamin may make the difference between normal life, degeneration, and death. The opportunity for service to humanity seems to be passing in part from the anatomist, internist, and biologist to the chemist, physicist, and engineer. It will avail little if the biologist finds that ultra-violet radiation for example is absorbed by smoke and dust unless the chemical engineer finds a way to retain the purity of the atmosphere. In seeking ever to further expand the span of human life, the chemist and the engineer must work hand in hand with the biologist and specialist in preventive medicine.

### *Light and Plant Life*

Before discussing the relation of light to animal life we must start by considering the role it plays in the plant. Scientists have shown that organic matter can be built up from carbon dioxide under the action of light if certain inorganic substances are present. Other scientists have shown that when carbon dioxide is passed through a solution of lime in water of a certain concentration in the presence of ultra-violet rays, certain organic compounds are formed which in turn under the continued influence of the rays are changed to starch and sugar. The chlorophyl of the green plant under the influence of sunlight is able to separate carbon from carbon dioxide, and hydrogen and oxygen from water, and from these to build up compounds which provide the materials for the growth of the plant and in which they are stored.

In animal life there are certain substances dissolved in the blood which act, in certain regards, like the chlorophyl in green plants. The hemoglobin is the coloring matter of the red corpuscles in the blood, while chlorophyl gives the green color to plants. Both these substances when subjected to certain treatments, yield the same product.

### *The Role of Calcium*

The part that calcium plays both in plant and animal life is of profound importance, and one that has not, until recently, been realized. It has been shown that there has been no civilization built up on the face of the earth where there is not an abundance of calcium either in the soil or in the irrigation water. An American scientist has shown that nutrient chemicals may be present in the soil in ample quantity and yet be unavailable for the plant if calcium is not present; and further, that the essential chemicals of the plant are lost by a leaching process if ample calcium is not present in the bathing fluids. In like manner, animal life is dependent upon calcium for cell formation in the organs and tissues as well as for the making of bone.

To illustrate the action of light on animal growth, the author mentions an experiment with four chickens. These chickens were all fed on the same diet which contained ample calcium but deficient phosphorous. One of these chickens had access to sunlight, the other three were kept in the dark. The sunlight chicken remained apparently normal, while those which had been denied sunlight showed decided weakening of the muscles and legs, and in fact, one was completely down. The diet had been the same in all cases; the only difference was sunlight.

### *Sunlight and Rickets*

The disturbance in the chickens above mentioned is quite similar, but not identical, with the rickets of childhood. This disease is characterized by a delayed and abnormal bone growth, with distressing warpage of the body contours as a result of the faulty bone formation. In childhood the teeth are also affected and unlike the bone of the body, the teeth can not be reconstructed—their defects are largely permanent. In the West Indies, where, owing to the climate, children are exposed to the sunlight much more than they are farther north, rickets are not found. As we go northward however, rickets become apparent, and are very prevalent in the north temperate zone. In some of the larger cities, approximately 90 per cent of all children under two years of age are affected by this disease. Adults also sometimes become victims of calcium deficiencies, which, while different from those of the young, are quite distressing and far-reaching in their effects. The excessive tooth decay suffered by the prospective mother is largely evidence of faulty calcium assimilation. It is well appreciated that calcium is necessary for the skeleton and teeth; it is not so well appreciated that every organ and tissue of the body is dependent upon it for its normal functioning. "When the calcium level is too low, function is slowed up and disturbed." The individual has a lack of pep, finds daily duties a drag, and nervous symptoms develop in the more serious forms.

### *Nature's Storehouse*

While under normal conditions the average adult requires six-tenths of a gram of calcium per day, this amount may be doubled or even tripled under certain conditions. Frequently the diet does not contain this amount of calcium and the body is compelled to borrow from its store. "Nature has a marvelous mechanism for storing calcium, for she uses the skeleton and teeth as a great depot to which she may go in an emergency." In most cases expectant mothers make a drain on their skeleton and teeth for the lime required for the young framework.

"During lactation the demand is quite as great as during pregnancy, for lime for the milk must be had even at the serious sacrifice of the mother's skeleton. It is not uncommon for cows that are being intensively milked to have their bones become so decalcified that spontaneous fracture will occur without any provocation. As the summer progresses there is often a marked change in the shape of the hip bones of dairy cows due to nature's borrowing from these storehouses as from all the bones of the body for the lactation period.

"Under the stress of severe illness, such as fevers, the body is compelled to make a great draft upon the calcium of the skeleton. Dental caries become very disturbing at that time. We have not appreciated why we have used milk in all periods of physical stress. It is most significant that milk contains calcium, and phosphorus in a concentration approximately ten times that required in the blood. It furnishes not only protein, carbohydrates, and fats for fuel and cell metabolism, but the minerals, chiefly calcium and phosphorus, which are equally indispensable in fighting infection. Microorganisms growing in the human body produce toxins which disseminate through the tissues and fluids and in the process of their neutralization and elimination the body uses calcium, which of necessity is lost in the process. Disease therefore, makes extreme demands upon the body for calcium, and when it is not available the capacity for defensive reaction is tremendously reduced and many an individual loses the fight because of the exhaustion of these essential weapons. The necessity for having an adequate supply of calcium is therefore apparent. Singularly large numbers of people perish for of calcium on diets abundantly supplying it.

### *Monitors for Calcium Metabolism*

"The animal body is marvelously provided with monitors to supervise over great fundamental phases of vital function. These are spoken of as the glands of internal secretion. Without some of these life cannot exist, and all are needed for efficient normal life. Two small glands in the neck about as large as peas, the parathyroid glands, are chiefly the monitors for calcium metabolism."

Although there are other glands which have some influence on calcium metabolism, the parathyroid glands are the only ones which, if removed cause death by the lowering of the calcium in the body fluids. If they are removed the serum calcium goes down from an average of 10 to 11 mg. per 100 cc. of serum to 5, 6, or 7 mg. The animal becomes very nervous, and usually goes into convulsive spasms generally terminating in death. If however, prior to death, some extract of parathyroid gland is injected into the animal, he will recover and live in practically normal health providing the extract is injected every day or so. In rats from which the parathyroid glands have been removed the microscope will very soon reveal changes in the structure of the growing teeth and they will readily break off when a little strain is put upon them. The functional capacity of these glands seems to be directly related to certain activating substances which come from the blood. There is a certain substance known as cholesterol which chemically is somewhat similar to fat, and is found abundantly in the skin and many of the body tissues. When cholesterol is exposed to ultra-violet light or sunlight, it takes on properties which aid the body in metabolizing calcium. Certain fats, particularly of butter and egg yolk, contain substances having similar properties. Cod liver oil is particularly rich in such a substance, being approximately 400 times as potent as butter in this respect.

"It is an interesting fact that the Eskimos of the far north, where the light is so restricted, live largely on sea life, particularly the fats of fishes, during the long winter. It is remarkable how the developing civilization has created what we may term an instinct. For example, the people living on the Isles of Lewis, north of Scotland, which are shrouded by fog and cloud, have a practice of taking as part of the diet for each day at least one stuffed cod's liver. Children are started on this ration in very early life. When our explorers have gone into the north seas for the winters, and have tried to subsist through the long period of darkness on canned foods, flavored to tickle the palate, they have developed diseases with which the Eskimos about them, whose diet they would scorn, would be unaffected."

### *Other Experiments*

The author now gives results of some exceedingly interesting experiments. He placed a large number of chickens on the same diet. Two groups of these were used as controls. One group was kept in the sunlight as much as possible; another, three hours daily; the other chickens were all kept in darkness except for the turning on of a ruby light when they were fed. In addition to their diet, one group received cholesterol activated and not activated. Another group received cod liver oil, raw and activated. Others were exposed to the ultra-violet ray, both with and without an interposing glass plate. Raw cod liver oil was rubbed on the necks of a group and activated oil on the necks of another. Finally, another group received parathyroid extract. In summing up the results, the author says:

"It will be noted from these data that whereas with cholesterol, not activated, added to the food, all died, with the activated cholesterol, 3 lived; further, that with the cod liver oil, activated in the sunshine 6 hours, 5 per cent added to the food, all died, and by placing a heavy window glass in front of the ultra-violet obstructing the rays, all died. (Of the group receiving unobstructed ultra-violet rays for 30 minutes daily, 3 lived and 3 died.) It should further be noted that rubbing cod-liver oil, activated 30 minutes in the sunshine, on the necks of the chicks saved 3 out of 6 and raw cod-liver oil used the same way saved 2 out of 6. Freshly made extract of parathyroid added to the food 1 per cent, saved 5 out of 6." The control chickens that were exposed to sunlight all day, and those exposed for but 3 hours daily, all lived.

A striking illustration of the value of sunlight is given in the report of two other experiments. A rat was deprived of both sunlight and activator to the extent that it was lying on its side and gasping as though nearly dead. It was then placed in bright sunshine and in two hours was up and eating; recovering on the same diet which had produced the disturbance simply by giving it sunshine daily. A group of chickens were fed on a diet low in phosphorus but ample in calcium, while being deprived of sunshine and radiant energy. After a time some were dead, many were gasping. 18 of these that were apparently lifeless, were placed in bright sunlight, and in two hours 10 of them were standing up and 4 were eating. The recovery was not due to change in temperature, since they were taken from a warm room. They were then returned to the same warm but darkened room, and in 24 hours all were dead.

### *The Smoke Screen*

During the winter time there are many days in which the sun can not be seen, and many others in which the sun is out only part of the time. In the larger cities the smoke nuisance adds another factor, and a condition is provided which cuts off nearly all of the ultra-violet part of our light even when the sun is visible. While this smoke is deleterious to buildings and house furnishings as well as to foliage, the really great injury is done to the health of the community. "We are not only cursing this generation which is grown up and the youth of today, but we are making it impossible for motherhood to function without the sacrifice of its very being as well as the blighting of the coming generation."

An appreciation of the seriousness of the situation is first needed, and then a program for the removal of those factors which lie within our power to control, which is certainly true of the smoke screen.

"We cannot remove the clouds. We cannot make the sunshine. We can, however, reenforce activation by artificial means. This does not mean that individuals should expose themselves to ultra-violet light from mercury vapor lamps, for these contain rays which are too short and are therefore injurious to be applied except under careful supervision. We can do as the Eskimos have done for years—draw on the stored-up sunshine of animal and fish life, for this activator or accessory food factor is chiefly soluble in fats. It is also present to some extent in some of the green vegetables provided they have been grown under direct exposure to the sunshine and not under glass.

"This, then, is the opportunity of this generation to take some obstructions out of the great river bed of life's current. They are not beneath us, but we are putting them in the sky above us. We must look to the chemists and engineers of tomorrow for the greatest advance in human health conservation that has occurred in many decades. Surely no problem can more directly and intimately affect human welfare than the preservation of the purity of the atmosphere and therefore permit, as nature has intended, that the life which has been made for this environment shall not be blighted by the polution of the atmosphere, thereby cutting off the radiant energy which is as essential for vital processes as are water and air and food."

## *Bread and Butter*

News columns are crowded with interesting items. Even the health and nutrition departments are full of humor and often they are packed with sound sense. Dr. William Brady in one of his inimitable answers to an eager seeker for dietetic truth set a high mark for other columnists to shoot at. "What," asks H. M. G., "can one eat that will give strength and at the same time not create high blood pressure?" And Doctor Brady answers: "Bread and butter, French fried potatoes, ham and eggs, pigs' feet and sauerkraut, Johnny cake and tea, macaroni and cheese, liver and bacon, cold onions, apple pie and milk and numerous less famous combinations. I believe this is just as sensible and as accurate as any answer to your query could be. It reminds me of the frequent quest of Dumb Dora for articles of diet which are nourishing but not fattening."

## *An Australian Visitor*

The bakers on the other side of the world are travellers. And whenever they come to this country they visit American Institute of Baking. William Shields of Australia spent a day at the School and as he sailed from Vancouver sent back his thanks for all the information he secured. "It was a fitting climax," he said, "to my very enjoyable sojourn in the U. S. A., so much so that I am already looking forward to a return visit to your country."

# Salt and How It Is Made

By M. H. Joffe
*Baking Service Department,*
*The Colonial Salt Company, Akron, Ohio.*

"HE'S not worth his salt." We often hear this expression concerning someone whose value is held in small repute. The meaning of course is that the worth of that particular person is compared with the small amount of an extremely inexpensive material he consumes. Salt is usually thought of as almost the cheapest commodity we have. We are not wont to associate romance with this plebian but vital essential, yet salt has had a romantic past. In the ancient days bitter wars were waged over sources of salt supply. Many times it has been a medium of exchange. Many of the ancient trade routes were laid out for the purpose of transporting salt. Because it is plentiful and cheap, we in this country and of this day and age can hardly realize the bloodshed that has been caused through lack of it, yet such a thing has occurred within the past few months. Quite recently in Equador some natives lost their lives in an attempt to storm a government warehouse with the hope of securing salt. In ancient days Roman soldiers were frequently paid partly in salt, and our word salary comes directly from this custom. So highly treasured was salt in the olden days that there is scarcely a language in the world that does not have some trite saying referring to the binding of friendship through the mutual partaking of salt.

### *Our Salt Deposits*

We in this country are particularly fortunate in our salt supply for it is found abundantly in many sections. The more important deposits are found in New York, Michigan, Ohio, Louisiana, Kansas, Texas, and California. In New York, Michigan, and Ohio, the deposits are found at a depth of from 1200 to 2700 feet. In some of the Kansas fields salt is found only 100 feet from the surface. These deposits are of varying thickness. Some of the New York and Kansas beds are 300 feet thick. One at Sperenberg, Germany, is known to be over 3000 feet in thickness.

In the early colonial days salt was obtained by allowing sea water to evaporate in open pans. This product, while not pure, was the best they could secure at that time. Salt works for producing this crude product were operated in Virginia as early as 1620. The first works approaching those of the present day were erected in New York State in the early 80's. Sea water is no longer used to any great extent as a source of salt. In some European countries salt is mined very much in the same way as coal, then dissolved in water and purified. It has also been mined in this country, but by far the most of our salt today is produced by a radically different process.

### *The Modern Process*

When the deposit has been located, and its depth and thickness learned, wells are drilled down into it and two pipes one within the other, are sunk to the bottom of these wells. Water under great pressure is forced down the outer pipe, and as it come in contact with the salt it becomes saturated with it, and is forced out as brine from the inner one. In some plants the water is allowed to flow into the well from natural sources, and the brine pumped out.

Modern salt works are extensive plants often covering acres of ground. It sometimes amazes the visitor that so much equipment is required for producing so inexpensive an article as salt. Such a plant usually has several salt wells, each of which is protected by a well house containing the equipment for pumping, etc.

As the brine is removed, increasingly large caverns are formed in the salt deposit. One with an imaginative mind will picture the beauty of these artificial caverns, deep down in the earth, dissolved out of the solid rock salt. They have never been seen by the human eye but what white fantastic shapes must there be!

### *The Settling Tanks*

From the well houses the brine goes to enormous settling tanks. These tanks may be two or three stories high. They are for the precipitation, not of the salt itself but of the impurities in the salt. After the impurities have left the brine it is pumped into huge storage tanks where it presents a beautifully clear, sparkling appearance. Looking down from the top, although the bottom is many feet away, it may be seen almost as clearly as though no liquid intervened. On a warm summer day the brine almost invites a plunge, yet, inviting though it may seem, such a plunge would be far from pleasant.

As the first step in forcing the brine to give up its salt, it is preheated. From this point two paths may be taken—one leading to the vacuum pans where hard cube salt is made, and the other to the grainer where the soft, porous, flaky variety is produced. The grainer is a vast shallow vat. Steam pipes run through its entire length, and below the pipes are ingenious automatic rakes. As the temperature of the brine is increased, and the water begins to evaporate, the point is soon reached where the salt leaves the solution and falls like fine snow to the bottom. The flow of the brine and the temperature are carefully controlled, so that a constant formation of salt is secured. The automatic rakes travel along the bottom of the grainer and slowly work the accumulated salt toward the front. Here it is forced up a slight incline, and most of the water drains out; however it still contains a considerable amount of it. More moisture is driven out by a series of centrifugal machines to which wide belt conveyors carry the wet salt, but the final drying is done in the kiln driers.

### *The Driers*

The kiln drier is nothing more than a boiler plate cylinder mounted horizontally and at a slight incline. A series of narrow shelves are arranged equidistant around the inner surface and run through the entire length of the drier. In the center is a cylindrical drum, also running the entire length of the drier, which is kept very hot by means of steam coils inside. The drier rotates very slowly, and the salt from the centrifugal machine as it enters at one end, drops from the shelf to the hot drum in the center. This operation is repeated hundreds of times during its slow journey through the drier. The moisture left by the centrifugal machine is driven off and carried away by fan blowers so that the salt as it comes from the drier contains not more than a tenth of one per cent.

The dry salt is now conveyed to the screening department where it passes over a series of screens varying in size of mesh. The fine salt drops through at the first or finest mesh screen. The next is somewhat coarser, and toward the end the very coarse salt is removed. Each grade goes to its own storage bin, and is then ready for packing and shipping.

### *Cube Salt*

The brine from which cube salt is made, enters huge vacuum pans which are really not pans at all, but are large airtight containers which look very much like huge tops. These vacuum pans are heated by steam and the air is removed by pumps. Everybody knows that water will boil at a lower temperature on the top of a mountain than it will at sea level. This is because the air at the top of a mountain is rarer than it is lower down. Vacuum pans are constructed on this principle. Some of the air is removed, and consequently water or brine boils in them at a lower temperature than it would in the open air.

The brine is pumped into the vacuum pans through open vertical copper tubes 6 to 8 feet in height, and surrounded by steam. As the boiling brine leaves these tubes the water vaporizes and the salt settles to the bottom of the pan.

From this point the salt is usually treated in exactly the same way as grainer salt. The vacuum pan produces salt much more economically than the grainer but the product has a hard crystalline structure which is much less soluble than the flake salt produced by the latter.

### *Special Salt*

The various types of salt found on the market are prepared by adding certain ingredients to pure salt. Iodized salt, so much advertised, is made by adding a very small amount of sodium iodide. Free running table salt results when a small amount of magnesium carbonate or similar material is incorporated.

After the salt has been purified there is yet much to be done before it reaches the consumer. Barrels and boxes of wood, cartons of paper, both rectangular and round, and sacks of cloth must be made in which to pack the product. The modern plant must therefore include a cooperage shop, and a shop where the pasteboard containers are made. No small part of this end of the work is involved in making the small cloth sacks, and the rapidity with which girls at sewing machines can turn out these sacks is marvelous. Then too, the modern plant must be provided with a well equipped printing department for labeling the containers, etc.

Power and heat are two vital factors in the salt plant, and a modern, efficient, and economical power unit is of course essential. Brine is very corrosive, and the wear and tear on machinery is enormous.

By applying modern inventions the manufacturers of salt have kept pace with other industries, and have made it possible for us to purchase for a few cents what in ancient days would have been the price of a king's ransom.

## *The Doughnut*

By Walter Drummond

There lived a thrifty baker
Who thought his wealth would grow
If he would make a doughnut
And hold out half the dough.

His plan was very simple
To reach a rich man's goal,
He'd make the circle thinner
And just enlarge the hole.

He started in to make them,
But very soon he found
It took more dough than ever
The hole to reach around

He fretted, fumed and worried,
And worked both night and day,
But, as the holes grew larger
He lost his mind they say.

This story points a moral,
That bakers all should know—
Don't try to make a doughnut
With half enough of dough.

Baker's Helper.

"Cooks must live by making tarts
And wits by making verses."

# Reduced to Death

## *The Perils in the Path of Women Who Reduce*

"MADAM," says Lin Bonner in a recent article in Liberty, under the above title, "before you start to chisel yourself down from a buxom thirty-six or thirty-eight to a miss's size sixteen, consider:

"Strenuous weight reduction, whether by violent exercise, starvation, or an ill-advised diet, or with the aid of 'sure thing' drugs, will give you your skinny ideal; but it also will make you scrawny, sag your skin, spoil your complexion, make you prematurely old—and, more to the point, make you LOOK old.

"Less important from the feminine viewpoint, perhaps, mad reduction methods may run you into anaemia, tuberculosis, chronic indigestion, kidney trouble, and other organic upsets. Even death is a real possibility."

We have been passing through a veritable epidemic of reducing for the past few years. Just how the epidemic started no one seems to really know. According to Mr. Bonner, one theory was that it was born from the desire to wear clothes like Irene Castle who at one time was pictured as the best-dressed woman in the world. The designers of women's clothes, especially in Paris, have received their share of the blame, and they in turn contend that they are only satisfying women's wishes. The movie queens have also been suspected, says Mr. Bonner. Be that as it may, the craze for reducing has been carried too far. From the standpoint of health, over-weight may be more dangerous than under-weight, for certain diseases are closely associated with obesity. On the other hand, thousands of women, according to Mr. Bonner, have been made invalids, many have died as a result of illness induced by over-reduction.

A weight reducing regime should never be undertaken except under the advice of a competent physician. There are certain conditions where it might be disastrous even to attempt to reduce. Mr. Bonner cites a pathetic incident of this sort:

"The people involved are in the millionaire class, high in the social scale. Less than seven months ago, the wife of Mr. S— was a beautiful woman, in her middle thirties, with a gorgeous complexion and a sunny disposition.

"The lady decided to trim down to the prevailing style in figures, estimating that about fifteen pounds would do the trick. She went on a rigid diet, indulged in strenuous exercises. The poundage came off, but with it she so broke down her tissues that today she is an old woman, with face and neck sagging, and her digestive apparatus so badly wrecked she cannot assimilate food. She is nervous, irritable, and hysterical. She is looking forward to death; for, despite the wealth of her husband, the doctors have not been able to repair the damage."

### *Weight Reducing Drugs*

Perhaps the most unfortunate phase of the situation is the appearance on the market of certain nostrums for which is claimed the property of taking off weight. A drug that is powerful enough to accomplish such a purpose, is an extremely dangerous one and should never be used except under medical advice. It must be said however, in this connection, that many of these nostrums contain no such drug, and also have not the slightest effect in taking off weight. Even soaps have appeared on the market with the absurd claim that they will dissolve out fat. A fraud order has recently been issued by the Post Office Department against one concern manufacturing such a soap. The danger lies not in these harmless nostrums which reduce only the size of the pocketbook, but in those that contain powerful drugs. Mr. Bonner gives as an example the case of the popular movie star Barbara La Marr. It seemed that she was taking on so much weight that exhibitors were complaining, and she was ordered to reduce.

"Without competent medical advice, Barbara undertook the job. With the aid of a patent medicine and a pineapple diet, she knocked off seventeen pounds in three weeks. She then switched to a diet of white chicken, one glass of milk a day, and an occasional lamb chop. But her diet was wrong, and, when a dormant tubercular condition of the throat became active, her resistance was so slight she could not combat it. Had she been properly dieted so as to retain her strength while throwing off the excess fat, the dormant disease might never have come to life."

### *Tuberculosis and Reducing*

According to Dr. Raymond Pearl of Johns Hopkins Hospital, in Baltimore, many cases of tuberculosis, some of them fatal, brought on by excessive reduction, have come to that famous institution.

Each individual is a "law unto himself," and a system which will apply to one person may not apply to another even though of the same weight. Family history, and background play a part:—

"There can not be an ideal scale of weights based on height and age. The insurance companies have no standard weight table and almost everyone rolls its own, as it were. Experience has shown them that there are several standards—the normal average, the normal overweight, and the normal underweight.

"Dr. Eugene Lyman Fisk, medical director of the Life Extension Institute, a leader in dietetics and overweight research, and co-author, with Professor Irving Fisher of Yale, of the volume entitled How to Live, says that up to the age of thirty it is just as well to be a bit underweight, but after that magic moment in a woman's life, she must not be radical either way—over or under.

"If she is overweight and goes in for sharp reduction, she's likely to find herself with a lot of wide-open spaces under her skin, where the fat once filled it out smoothly.

"Dr. Fisk is a firm believer in, and teacher of, 'see your doctor first.' As a matter of fact, that's what his institute exists for. Its experts look you over, find out what's wrong, and then tell your doctor so that he can put you right.

"Proper diet and moderate exercise are favored by Fisk as the ideal method of reduction."

### *Exercise for Women*

There is less stress emphasized nowadays on exercise for women. In fact, from many quarters warnings against too violent exercises have been heard. According to Mr. Bonner:—

"Moderate exercise is desirable for both men and women; but the tissue-burning brand which so many use in their reduction routines is not.

"The United States Public Health Service, which has been interested in the subject of reduction even to the extent of giving instructions via radio, warns against violent exercise, though urging exercises as a companion of the diet in reduction programs."

In selecting a diet and exercise for the reduction of weight one should take care that the reductions are not accomplished too rapidly. From four to six months should be required for a weight reduction of 25 pounds.

While to most women the slender figure is desirable from the standpoint of physical appearance and comfort, to women of the stage it is largely a matter of business. The contracts of many film stars contain clauses which require them to keep their weight within certain limits, and therefore the matter of diet and exercise is one of great importance to them. At least one of the large movie corporations has installed a modern gymnasium under the direction of an expert who prescribes the proper exercises for the girls, and at the same time competent physicians advise as to their diet. In this way they keep to the required weight without harmful results. If women off the stage would be equally careful in their reducing, less harm would follow.

### *Danger of Drugs*

Mr. Bonner's excellent article concludes with warnings against the use of the so-called reducing drugs, etc.

"Fisher and Fisk, in How to Live, say of reducing remedies: 'The public is warned against all preparations for the reduction of weight. There are no special breads, baths, drugs, mineral waters, or other similar forms of treatment that have any merit. Some of these preparations are distinctly harmful.'

"Dr. Hugh S. Cumming, Surgeon General of the United States Public Health Service, said in a letter: 'The use of so-called "patent medicines," drugs, or nostrums for the purpose of reducing weight, is so obviously dangerous that the practice should be discouraged in the interest of public health; and a warning that medicines should never be used for this purpose, except under the supervision of a physician, is timely.

"Almost everyone of the medicines advertised as reducing agents is a thyroid preparation carrying the danger of goiter, or a concoction of violent salts; and the American Medical Association for years has been running their makers and purveyors out of business or into jail.

"If you have any of these advertised remedies in the medicine closet, ladies, throw them away, because—here's a tip:

"The boyish figure is filling out. The Paris designers are sending us models which call for figures constructed more along the Venus lines, with a modest display of hips and busts."

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## *White Bread in Japan*

When Mizutani graduated from the American Institute of Baking he said he was going back to Japan to make good bread for his countrymen so they would grow tall and strong like his fellow students in America. He has often remembered his instructors at the Institute and a recent letter told of his success in increasing the use of white bread. He sent many pictures of his large plant, fully equipped with automatic machinery including a travelling oven and expressed the hope that bakers from this country would sometime stop in their world travels to see him in his laboratory or office in Osaka.

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## *A Large Cake*

Probably the largest cake ever made was the one ordered by Frederick William I, King of Prussia, to regale his army in June, 1730. History tells us that 36 bushels of flour, 200 gallons of milk, one ton of butter, one ton of yeast, and 5,000 eggs were used in its makeup.

The finished cake was 18 yards long, 8 yards broad, and more than half a yard thick. It required a special car drawn by 8 horses. It was so large that 30,000 soldiers could not eat it all. Unfortunately records do not show what sort of oven was employed in baking this cake nor why so little flour in proportion to the other ingredients was used.

# Food Adjuncts as Appetizers

### *Flavors and Spices Play an Important Role*

ALL of us have had the sensation of the mouth watering at the sight of a tempting display of food. It is well known that the sight and odor of food will start the secretion of the digestive juices and prepare the stomach to receive it, but it may not be so well known that the sound of cooking will have the same effect. Such is a fact, however, as may be noted when we hear the sputtering of ham as it is being fried in another room out of sight, and before the odor reaches us.

The complexity of our digestive system is such that for a food to properly perform its function it is not sufficient that it contain all of the so-called food essentials, but it must make an appeal to our senses as well. The experienced chef well knows the desirability of presenting food in such form as to appeal to the eyes as well as to the senses of smell and taste.

There is a class of food substances which while having little or no nutritional value, are important as aids to digestion in that they serve to stimulate the secretion of the digestive juices. These are called food adjuncts, and include the flavors and condiments. Salt can hardly be included in this category because it is a food essential. It does, however, act somewhat in the capacity of a food adjunct in that it not only lends a flavor of its own to food, but when used in small quantities has the property of bringing out other flavors. Many cooks use a small amount of salt in coffee, not that the taste of salt is desired, but because it will bring out the coffee flavor more sharply. When a melon is slightly salted, its natural flavor is greatly improved in the opinion of many persons.

Spices and flavors are typical food adjuncts. Spices when used in considerable quantities also have the effect of preserving food. While spices and flavors have no food value they have a purpose to serve, and moreover, add to the joy of living. The flavor of a food appeals through the sense of smell as well as taste. The sense of taste is somewhat limited. Outside of the sensations produced by sweet and sour, bitter and salty, it tells us little. The sense of smell is much more important in this connection. It is appealed to both before the food is taken into the mouth, and during mastication. We are willing to pay many times more for candy than for sugar because sugar appeals only to the taste, while the candy is usually perfumed with the aroma of different flavoring ingredients, the fragrance of which we enjoy by exhaling through the nose while eating it. Vinegar tastes sour, on the other hand, acetic acid which is the cause of the sour taste, makes no appeal, because it lacks the aroma of the cider, wine, or malt of which vinegar is made. All of us have noticed how flat food tastes when we have a cold in the head and our sense of smell is impaired. If we hold our nose, it is difficult to distinguish one food from another by taste. The mother makes use of this fact by holding the nose of the child to whom she is administering a noxious medicine.

Coffee and tea in a sense may be considered as food adjuncts, though both have some food value if cream and sugar be used with them. America has been called the land of the coffee drinker, more coffee being consumed per capita here than in any other country. Cocoa, especially when made with milk, should be considered more as a food.

Many pages have been written on the psychology of eating, for it is not what we eat, but how we digest it, that really counts. For the normal digestion of food one's mind should be in a state of harmony, and the surroundings should be such as to make this possible. One of the reasons why home-cooked food is considered so much better than restaurant or hotel food is because it is eaten in the home.

Just as tranquility of the mind aids in the normal secretion of the digestive juices, anger, fear, or worry have the opposite effect. A student in college trying to pass a difficult examination, may be so influenced by worry and anxiety that the stomach will show a decrease in the secretion of gastric juices and it may take twice as long to digest food as under favorable conditions. A man unaccustomed to public speaking is painfully aware that his mouth becomes dry when called upon to face an audience. A wise mother will not punish a child for a misdemeanor directly before or after a meal, but will wait until the meal is digested before inflicting it.

Regardless of what we have learned in recent years concerning food and digestion, the old saying still holds good, "A good laugh is the best sauce."

Roscoe H. Shaw.

## *Service Brings Success*

From a recent fear of being exploited by large aggregations of wealth, the people of America are learning to make such great concerns their most faithful servants. This problem is not entirely solved yet. Here and there abuses occur, but business is gradually being taught that the only method of permanent success lies in an honest, faithful, conscientious service to the public. Calvin Coolidge.

## *Hot Lunches for Children*

The problem of a hot and nourishing lunch for the child who brings food from home is one that bothers many teachers and mothers particularly in rural communities. A clever idea was developed in the middle west, and is spreading rapidly. The plan was recently described by the Advisory Nurse of the Maryland State Department of Health. She suggests that cooked food be brought from home in wide mouthed jars which are later reheated at school in a wash boiler fitted with racks. The foods she suggests are combinations of vegetables, different soups, or stews, with bread and butter, fruit, and simple cake as making a complete and nourishing meal.

Could bakers operating a rural route cooperate with this endeavor to see that children are properly fed by arranging to deliver the bread and cakes at the school at a cost within the reach of these children?

## *Summertime Foods*

Hot cereal has absolutely been omitted from these midsummer breakfasts, and for at least five mornings no cereal at all is served. It is a good plan to get one's summer energy from less hearty food than hot porridge.

Frankly, one advises a larger portion of white bread and butter during the warm days. It is usually more bulky and appetizing for the summer appetite and its lack of salts may easily be made up by the lavish use of vegetables. The whole grain breads may appear several times a week, but are really better reserved for the cooler weather. —Brooklyn Eagle.

When the bread is eaten the kindness is not forgotten. —Old Danish Proverb.

# Sugar in Breadmaking

## *Some Experiments with Cerelose and Cane Sugar*

By C. B. Morison and P. L. Gerber

## PART II.

THE first part of this series of papers on "Sugar in Breadmaking" presented a convenient practical classification of saccharine or sugar containing ingredients, with analyses of various members of the seven classes of these ingredients used in the bakery.

The commonly accepted simple classification of the sugars and other carbohydrates from the chemical standpoint, is of considerable importance to the baker for a better understanding of dough fermentation and also for a more exact appreciation of the meaning of scientific terms applied to the carbohydrates and their synonyms of every day speech.

The term carbohydrate was formerly applied to those compounds of carbon, hydrogen, and oxygen, in which the carbon is present in multiples of six, and the hydrogen and oxygen in the two to one ratio to form water. A carbohydrate was merely a simple compound of carbon and water, and since the composition of sugars, dextrins, and starches, conformed to this idea, they were termed carbohydrates. As the chemistry of the carbohydrates developed, new facts on their constitution were discovered and it is now impossible to include all the sugars within this old but simple definition, as some of them have been found with less than six carbon atoms, and in others the hydrogen and oxygen do not occur in the water ratio.

The carbohydrates used in breadmaking, however, may be defined according to the old common understanding of the term and arranged according to the following simple classification:

### 1. SIMPLE SUGARS OR MONOSACCHARIDES.

Formula, $C_6H_{12}O_6$

| *Scientific Term* | *Common Synonym* |
|---|---|
| **(a) Glucose** | **Dextrose, grape sugar, starch sugar, corn sugar, cerelose.** |
| **(b) Fructose** | **Levulose or fruit sugar.** |
| **(c) Galactose** | |

Glucose is probably the most widely distributed sugar in nature and is found in the juices of many fruits and plants. It also occurs in the blood and tissues of many animals. Glucose is also a constituent of many higher sugars and compounds known as glucosides.

Common synonyms for glucose are dextrose, grape sugar, starch sugar and corn sugar. As previously noted, the trade designation Cerelose is applied to this sugar.

The simple sugar glucose should never be confused with "commercial glucose" or "corn syrup," since this is a complex mixture of carbohydrates, and not an individual sugar. Glucose is directly fermentable by baker's yeast.

Fructose, commonly termed fruit sugar is found associated with glucose in many fruit and plant juices. It is a constituent of honey, invert sugar syrup and molasses. It is directly fermentable by baker's yeast.

Galactose is not found free in nature, but is present in some of the higher sugars, such as lactose or milk sugar and many plant glucosides. Galactose is also fermentable by yeast.

## 2. COMPOUND SUGARS OR DISACCHARIDES.

Formula, $C_{12}H_{22}O_{11}$

| *Scientific Term* | *Common Synonym* |
|---|---|
| **(a) Sucrose** | **Saccharose, cane sugar, beet sugar.** |
| **(b) Lactose** | **Milk sugar.** |
| **(c) Maltose** | **Malt sugar.** |

Sucrose, or cane sugar is found in many natural sources with glucose and fructose. Common commercial sources of sucrose are the sugar cane, and sugar beet. The sugar palm and maple are also sources of sucrose. Pure sucrose from whatever its source is identical, and sucrose from the sugar beet is the same as sucrose from the sugar cane.

When sucrose is subjected to the action of acids or enzymes under proper conditions, one molecule each of glucose and fructose is formed. This product is termed "invert sugar," and the process "inversion," or more properly hydrolysis.

Sucrose in ordinary amounts is rapidly hydrolysed in bread doughs to glucose and fructose by the enzymatic activity of the yeast. A similar enzyme action takes place when sucrose is taken into the body through the agency of the intestinal juice which also contains an enzyme which hydrolyses sucrose to the simple sugars, glucose and fructose.

Maltose or malt sugar is widely distributed in nature and is present abundantly in germinating grains. It is a constituent of malt extracts and syrups. Maltose is produced by the action of diastatic enzymes on starch.

In bread doughs maltose is hydrolysed to glucose by the enzymatic activity of the yeast.

Lactose or milk sugar is found in milk. It is not fermented in bread doughs by baker's yeast, though there is probably a very slight hydrolysis of this sugar during fermentation of the dough by bacterial activity or increase in acidity. Lactose is hydrolysed by acid and enzymes to glucose and galactose.

## 3. POLYSACCHARIDES.

Formula $(C_6H_{10}O_5)_x$

(a) Starch
(b) Dextrin
(c) Cellulose

The polysaccharides are formed by the condensation of an unknown number of simple sugar molecules, and their constitution is highly complicated.

Starch is the chief carbohydrate reserve food of the plant and constitutes a large proportion of the dry weight of the cereal grains. It occurs in the plant in the form of characteristic granules which differ greatly in their appearance and properties.

In dough fermentation a slight amount of the wheat starch is converted into maltose by the action of diastatic enzymes present in the flour, or by the diastatic enzymes of ingredients such as malt extracts and malt flours.

Dextrins are complex conversion products of starch, produced by the action of heat, acids, or enzymes. They are intermediate between starch and maltose.

Cellulose is the wood or fibre constituent of plant tissues, and in the statement of analytical results the term "crude fibre" refers to cellulose.

The above simple chemical classification of the carbohydrates, includes those which are important in baking, and are present in the various ingredients as indicated by the analysis.

According to established facts, the two simple sugars, glucose and fructose containing six atoms of carbon in their molecule, and for this reason called hexose sugars by the chemist, are directly fermentable by baker's yeast with the production of carbon dioxide and alcohol, and very slight amounts of other products of fermentation. The disaccharide sugars, sucrose and maltose, are hydrolysed to simple or hexose sugars by yeast activity. Sucrose is hydrolysed to glucose and fructose, by the yeast enzyme invertase or sucrase, and maltose to glucose by the yeast enzyme maltase.

The role of starch as a potential source of maltose in a fermenting dough is dependent largely upon the diastatic activity of the dough and the physical condition of the starch.

The production of carbon dioxide gas in a bread dough by the enzymatic activity of the yeast is dependable primarily on the presence of hexose sugars during the fermentation period, and to other more complicated factors that will be discussed later.

The addition of ingredients to the dough batch for gas production is thus restricted to those carbohydrates which are themselves hexose sugars, (glucose and fructose,) or to disaccharide sugars, (sucrose and maltose) and in a minor degree to polysaccharides, (starch and dextrin) that may serve as a source of hexose sugars during fermentation.

As previously noted, glucose or dextrose is the onely commercially available individual hexose sugar which may be used for this purpose at present since levulose has not yet been produced on a commercial scale.

The fermentable sugar content of the various classes of ingredients that are used in the dough batch can be calculated readily from their respective analyses. In the construction of bread formulas for the various kinds of bread, a knowledge of the sugar content of such ingredients is necessary so that excess amounts of sugar and waste may be avoided. In some formulas which have been examined, it is evident that those responsible have given this point no attention, and based the amount of sugar on that directly weighed out and added to the dough and neglected the amounts carried by such ingredients as malt extracts, syrups and sweetened condensed milk.

It is well known that in the older systems of bread production little or no sugar containing ingredients are employed. The inclusion of sugar in bread doughs has been developed to a greater extent in the United States than elsewhere. It is quite probable that the origin of this practice was first due to practical requirements for decreasing the fermentation period and thus making a more rapid production of bread possible than to other well known effects associated with flavor, taste, color of crust and bloom.

The recognized advantages to be secured by the addition of the proper kinds and amount of sugar to the dough batch are a more rapid and uniform rate of gas production, resulting in a shorter and more satisfactorily controlled fermentation and effects on flavor, taste, color of crumb and bloom. The amount of fermentable sugar required is dependent upon a number of factors, important among which are the amount of yeast, the temperature and time of fermentation, and the temperature of baking.

The third section of this series of papers will discuss the results of a series of comparative baking tests on the effects of adding various amounts of the hexose sugar glucose in the form of Cerelose and similar amounts of sucrose or cane sugar to white bread doughs.

(To be continued)

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According to Pliny the elder who lived at about the time of Christ, the Gauls and Spaniards saved the scum from the drink which they had devised from wheat, to raise the dough, and consequently their bread was the lightest of all.

**Pantropheon.**

## *Food Facts for Menus*

THERE is a growing resentment against the self appointed teacher of dietary practices as it develops that most advice to eat raw food is given by those who have raw foods to sell and that the loudest advocates of strange and unusual food habits have their methods bound between book covers which may be purchased after the lecture.

There is another type of food advice which is helpful, the information about food choice which enables the diner to select good food combinations from the menu.

Many progressive restaurants now show the nutritive value of food in such a way that one may arrange his calory intake in an intelligent manner. The Kahler Hotel at Rochester, Minnesota, has a department of dietetics and studies diets as carefully as it does any other item of its service. It publishes a book of food facts for its patrons and succinctly sets out its creed in the statement that "a properly balanced diet is the hub around which the wheel of life revolves." Its division of the essential food elements into carbohydrates, protein, fats and accessory food materials is definite and complete and avoids the too common mistake of classifying foods into good and bad groups. There are no bad groups in the Kahler arrangement. Rather there is a sound appreciation of the fact that all foods are good foods when eaten under proper conditions.

With the increasing tendency to go outside the home dining room for food there is placed in the hands of restaurateurs a splendid chance to give sound nutritional advice. If the suggestions are simply phrased and kept free from the folly of fads and dietetic absurdities they will do much to build up a better understanding of the importance of an all around diet which is complete without being rigorous or unpleasant.

## *Bread a Title Maker*

"The origin of Lord and Lady is so interesting that we cannot resist the temptation to give it here. The Lord was simply the loaf-ward, the guardian of the loaf or the food, the band that kept the house together, that is to say, the houseband—later, the husband.

"The lady was simply the loaf-kneader, the maker of the loaf, the one who attended to the domestic duties. The spinster is one who does not become a loaf-kneader (or lady) but sits at the distaff and spins or winds the thread."

Customs of Mankind.

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## *They Must Keep a Bee*

"Because we know that All White Sugar, during the refining process, is DEMINERALIZED we are now sweetening Our Entire Wheat Rolls and Breads with strained Clover Honey."

—From a Leaflet Distributed by the Arcade Cafeteria.

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We wish to thank you very much indeed for the booklet entitled "Baking Science and Human Welfare."

We are very proud of our membership in the American Institute of Baking. We know it will be helpful to us in our business, and we want to assure you if we can do anything for the Institute, we will be glad to lend you our assistance.

We have in our employ one of your students, Mr. Roderic Hauck. He seems to be a fine young man and he is giving us some valuable information in our bread bakery, and we feel that he is going to be a very good man for us.

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"The Norman kings subjected the bakers to very severe laws with respect to the weight and price of bread. The first offense was punished by the confiscation of their bread; the second by a fine; and the third by the pillory." Pantropheon.

# Books for the Baking Laboratory

RECENT DEVELOPMENTS IN MINERAL METABOLISM. By Agnes Fay Morgan, Ph. D. The Modern Hospital, Chicago, August 1926.

In this most valuable resume of recent work on mineral metabolism, Dr. Morgan has much to say about some of the rarer inorganic elements found in food. In commenting on some of these she speaks of the work of McHargue and others who brought out the effect of the presence or absence of minute quantities of manganese, silicon, copper, and other elements in the soil, on plant growth, and indicates that this pointed the way for similar work by animal nutrition investigators. Because of the minute quantities in which these elements exist, they have been associated with vitamins. In fact, McHargue concludes that possibly the manganese compound may be identical with vitamin B and a similar copper compound with vitamin A.

Copper and zinc have been found in marine animals by H. W. Severy who believes they serve as oxygen carriers in the lower forms of sea animals. Other investigators have found small amounts of copper in cows' milk as well as in human milk. An excessive copper content in milk tends to rapidly destroy vitamin C and hence it is not desirable to pasteurize milk in contact with copper or brass kettles or pipes. Other workers have shown that chronic copper poisoning may lead to diseases of the liver and pancreas.

McCollum and his co-workers have shown that the addition of small amounts of fluorine to the diet of rats effects the quality of the teeth, producing overgrowth, but imperfect enamel. The work of Daniels and Hutton, and others has shown that successful reproduction with rats on a milk diet can be obtained only when traces of fluorine, iodine, manganese, silica, aluminum, and iron are added to the diet.

Dr. Morgan discusses the relation of minute quantities of iodine to goiter and points to the work of Kimball and his co-workers who had marked success in preventing and reducing goiters in Akron, Ohio, by administering sodium iodide to 4,000 school girls.

In discussing the relation of iron to the diet, Dr. Morgan refers to the work of Whipple and Robscheit-Robbins who some years ago announced that inorganic iron is ineffective in cases of anemia, but who later reversed their decision and announced that inorganic iron effected rather rapid blood regeneration, although liver was even more effective. The work of other investigators does not support Whipple's later announcement.

Some recent work of importance by Hart, Steenbock, and co-workers at the University of Wisconsin indicate that some pre-formed complex, possibly of vitamin character, is necessary for the utilization of iron in blood formation.

With this new interest in iron, improved methods for analysis have been brought out and new figures for the iron content in the various cuts of meat have appeared. Beef liver, heart, spleen, and brain are the best meat sources of iron, with beef and veal muscle meat following, and pork and lamb last in order.

The author discusses in a very interesting way the immense amount of work that has been accomplished regarding calcium and phosphorous metabolism since Mellanby's experiments in 1919 when it was generally believed that vitamin A was the antirachitic vitamin. Sherman, McCollum and others shortly afterwards devised rachitic diets for rats which paved the way for the study of rickets with that animal, and permitted McCollum and co-workers to show in 1922 that cod liver oil in which vitamin A has been destroyed by oxidation, still has antirachitic properties. Thus vitamin D was added to the list.

The remarkable work of Hess, Steenbock, and others, on the effect of the ultra-violet ray and sunlight on foods in developing antirachitic properties is well reviewed, as well as the rather astounding work of Steenbock who showed that milk can have its antirachitic properties increased as much as 24 times by exposure to the light of the quartz mercury vapor lamp, and that by exposing the animal in like manner the same results can be obtained promptly but less completely.

Hughes has shown that ultra-violet radiation of the hen not only increases the antirachitic properties of the eggs, but also increases the ability of these eggs to hatch.

The practical deductions that may be drawn from these results are astonishing. "We may look forward to a new era in agriculture in which the mercury vapor lamp and cod liver oil will be a part of every dairyman's and livestock raiser's equipment."

We are indebted to Dr. Morgan for having brought together the recent work on mineral metabolism in a concise and readable form.

Roscoe H. Shaw.

# *Abstracts of Technical Articles*

### Selected for Baking Technology from Chemical Abstracts

**Manchurian wheat and wheat flour.** T. Tsukinaga and T. Nishino. J. Pharm. Soc. Japan, No. 527, 21-36 (1926).—The variety of wheat grown in Manchuria and its flour were analyzed and their quality was compared with the various foreign products. Extensive data thus obtained are given in 10 tables. The average obtained from analysis of 19 varieties of Manchurian wheat shows that 100 parts of dried wheat contained 19.62 crude protein, 2.60 crude fat, 70.76 soluble nitrogenous substances, 3.47 crude fiber and 3.55 ash. Four grades of the Manchurian wheat flour contain, respectively, crude protein 15.512% for the best grade, 15.501 for the second, 17.907 for the third and 18.779 for the fourth; crude fat, 1.151, 1.328, 1.989, 2.485; soluble nitrogenous substances 81.387, 81.351, 78.096, 75.911; crude fiber 1.471, 1.232, 1.448, 1.534; ash 0.479, 0.588, 1.115, 1.291; and crude gluten 13.878, 14.691, 15.726 and 16.537. Manchurian wheat contains more nitrogenous substances, crude fiber and ash, but less soluble nitrogenous substances. It contains the best elements to make flour, but it is small and produces less flour. Canadian wheat and its flour contains more crude fat and soluble nitrogenous substance than the Manchurian. The method of analysis used is given in detail.

S. T.

**Fermentation in the baking industries.** David Ellis. Ind. Chemist 2, 249-51, 322-5 (1926).—An exposition of the general principles of fermentation, especially as applied to bread making, is followed by detailed descriptions of the preparation of bakers' dough with yeast and also by the various barms still in use in some parts of England and Scotland. Fermentation in jam and in royal icing is discussed more briefly.

E. G. R. Ardagh.

**Report of Committee on Methods of Analysis for American Association of Cereal Chemists.** D. A. Coleman. Cereal Chemistry 3, 254-82 (1926).—The report is so comprehensive that the original must be consulted. It includes several methods for standardizing solutions, methods of proper sampling, and methods of determining moisture, ash and protein. Many of the methods were adopted as the methods of the American Association of Cereal Chemists and will be used by them.

L. H. Bailey.

**Comparison of the Official with the Hertwig and Bailey Method for Ashing Plant Tissues and Products.** By Charles F. Rogers, Colorado Agricultural College.

Numerous tests were made upon various plant materials, using both the Hertwig and Bailey and the Official methods simultaneously. Corn smut spores, finely pulverized twigs of apple trees, freshly dried sweet corn and seed peas were used. These are tissues with high fat, cellulose, sugar, and starch and protein contents, respectively, which probably behave differently during their combustion.

In most cases, more than two samples for each method are compared. Different temperatures for ignition were tried, and the crucibles in the later tests were heated to constant weight, in successive periods, of length stipulated in the methods. The effect of the size of the sample on the time necessary to reach constant weight was also investigated.

In general, it was found that, at the lower temperature used, a slightly higher ash content resulted in both methods of heating. In practically every case, at all temperatures, the Hertwig and Bailey method gave greater apparent ash values. The time required to bring crucibles to constant weight indicates that tissues high in protein do not form so porous a coke with the glycerol-alcohol mixture, and do not burn to a white ash so quickly as other tissues. High cellulose-content samples seem to be little aided by the Hertwig and Bailey process, though there is the advantage of time saved. The fatty substances used have slightly larger experimental error in the determination of ash, but show a considerably greater ash content with the shorter exposure to the higher heating temperatures. Carbohydrates in sweet corn seem to be materially aided in their combustion by the glycerol-alcohol mixture for the accuracy of the ash determination by use of the Hertwig and Bailey method is greater than with the Official method.

On the basis of the data at hand, it is safe to conclude that the Hertwig and Bailey method for the ashing of plant tissues of various kinds is as accurate as the A. O. A. C. official method and has the advantages of shorter ignition time, and less chance for the loss of some of the volatile mineral constituents.

This work was done partly in the laboratory of plant physiology, Iowa State College and partly in the laboratory of plant physiology, Colorado Agricultural College, Fort Collins, Colorado.

## *A Study in Economics*

WHAT is time worth? The mechanic who plasters our ceilings or unwrinkles bent fenders knows exactly what his time is worth and his estimates show no tinge of modesty. But the inevitableness of baking day has kept generations of women chained to routine work over the bread board, and it is but recently that they have dared to set a value on their own time and labor and to estimate the possible economies which they might make by going outside the home for some of the products of their labor.

Today such problems are being worked out for women. One simple question is discussed by the Institute Forum in a recent number of Good Housekeeping as follows:

"Let us take the problem of home-made cake versus, baker's. Plain white cake may be purchased from a baker for nineteen cents per pound. This includes the cost of raw material and fuel, labor, upkeep and overhead expenses. The ingredients and fuel alone for the same cake made at home would cost fifteen cents, for we can not buy at wholesale prices. If we should spend one-half hour in making this cake, and put a value of fifty cents an hour on our time, it would be necessary to add twenty-five cents to the price of the cake, and this at the price of unskilled labor. If we do not count the cost of our labor, the difference between the price of the material in the home-baked product and the cost of the bakery goods is the money which we earn in purchasing supplies and in using our time in the kitchen. The problem, then, is whether or not it is justifiable to spend time producing a cake of known nutritive value and of the particular flavor, texture, and decoration we desire, or whether we should be of greater value to our families if the time were spent in other ways."

## *The Bread of Abraham*

"LET us go no further back than the year 2000 before the Christian era, and enter together the tent of the father of nations—Abraham. We might lead you to the fireside of each of the nineteen patriarchs who preceded him, but that would take us too far.

"In the interior of this nomad dwelling, Sarah, the venerable companion of the Pastor-King, has just prepared, with flour and water, round pieces of flattened paste, which she places on the hearth, and covers afterwards with hot ashes. It was thus that princes and servants made bread in the East. The Jewish people who inhabited the desert ate no other kind; and the prophet Elijah, reposing under the shade of a juniper tree, appeased his hunger with this simple and primitive food. Sometimes, however, at certain periods of solemnity, the Hebrews used a gridiron, placed on the coals, or a frying-pan into which they put the paste; but these various modes of cooking produced a kind of cake, dry, thin, and brittle, somewhat like the Jewish Passover cake which was broken by the hand without the aid of a knife; they were called lechem, choice and chief food, and the mother of the family generally renewed them each day. The inhabitants of the East thought so much of bread, that it was considered a special mark of regard and hospitality to the person to whom it was offered. Boaz says to Ruth: 'At meal time come thou hither and eat of the bread, and dip thy morsel in the vinegar.'"

**Pantropheon**

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"One might say that civilization itself has been nourished and has grown big on bread. It is one of the oldest, most widely used and most nourishing foods of man."

**Customs of Mankind.**

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